# 3.0 AFFECTED ENVIRONMENT

This chapter inventories and characterizes the economic, environmental, and cultural resources in the Gravina Access Project area that might be affected by the proposed project alternatives. This information is drawn from the technical studies for the project performed for DOT&PF by HDR Alaska, Inc., and its affiliates, as listed in the References section.

## 3.1 LAND USE

### *3.1.1 Current Land Use*

Figure 3.1 (Land Ownership), Figure 3.2 (Zoning), and Figure 3.3 (Land Use) show current land ownership and uses in the project area, as discussed in this Section 3.1. The subsections below discuss these issues.

Note that Native lands in Alaska are typically held by regional and village Native corporations formed by the Alaska Native Claims Settlement Act. With very limited exceptions (and none along Tongass Narrows), there are no Indian Reservations. Native corporations have been making selections from federal lands over several decades, and some of these selections are still underway in Southeast Alaska. Native Corporations also have purchased commercial properties and run businesses in many communities, including Ketchikan. Some of the "private ownership" land noted below is held by Cape Fox Corporation, which owns hotels and restaurants, among other holdings. No large land areas generally selected by Native corporations are in the mapped project area.

#### 3.1.1.1 Revillagigedo Island

***Ownership.*** On Revillagigedo Island, most of the land in the project area is privately held or owned by the Ketchikan Gateway Borough (Borough). Areas outside the limits of the cities of Ketchikan and Saxman are largely a mix of state and federal ownership.

***Land Use.*** Ketchikan and Saxman are typical Southeast Alaska waterfront communities. Most of the developable land is densely developed, clustered along the shoreline, and the uses are mixed: commercial, industrial, residential, and institutional.

#### 3.1.1.2 Pennock Island

***Ownership.*** Most of Pennock Island is owned by the Borough, with private ownership occurring along parts of the shoreline.

***Land Use.*** Pennock Island is primarily undeveloped, but there are residences along the shoreline. Some residences use small streams as a source of drinking water supply. The island contains registered archeological sites. Subsistence use of the island includes hunting and berry picking.

#### 3.1.1.3 Gravina Island

***Ownership.*** On Gravina Island, most of the land (64%) is owned by the U.S. Forest Service (USFS). The remainder is owned by private interests (4%) and other public agencies, including

the State of Alaska (16%), Ketchikan Gateway Borough (7%), University of Alaska (3%), and the Alaska Mental Health Trust Authority (6%).

***Land Use.*** Most of Gravina Island is undeveloped. The existing development lies within the project area on the eastern side of the island. The principal developments include Ketchikan International Airport (the Airport Reserve area), a timber processing plant north of the airport (directly across from Ward Cove), and private residences on the southeastern shore (Clam Cove area) and at the northernmost portion of the island. The zoning map (Figure 3.2) shows the currently allowable (planned) uses for private, state, and Borough-owned properties on Gravina Island.[1] As the map shows, intended uses for these areas include future development, airport development, general commercial activities, residential, and heavy and light industrial uses.

*USFS.* The USFS land, a mixture of alpine ridges, wetlands, and various types of forest, is managed for multiple uses under the 1997 Tongass National Forest Land and Resource Management Plan. The land provides wildlife and fish habitat, scenic viewsheds, and land held for potential timber production and mineral exploration. In 2002, the USFS prepared a Draft Supplemental EIS for its 1997 Tongass National Forest Land and Resource Management Plan that considers alternatives with new wilderness recommendations for Tongass National Forest. One of the eight alternatives included in the Draft Supplemental EIS recommends wilderness area on Gravina Island; however, the preferred alternative is No Action.

*Alaska Department of Natural Resources.* Most of the DNR land is in remote portions of the project area and near Bostwick Lake, Blank Inlet, and Vallenar Bay. The DNR areas and recommended land uses are:[2]

- *On the shoreline southeast of Clam Cove*: Reserved for state interests only.
- *On Vallenar Bay*: Commercial forestry, dispersed recreation areas, settlement, timber, anadromous streams, and important habitats and wildlife movement corridors.
- *Adjacent to and west of California Ridge (including the area around Bostwick Lake*): Dispersed recreation, timber harvest, wetlands, and wildlife habitat.
- *Small islands, beach, tidelands, and marine waters on the southern tip of Gravina Island*: Dispersed recreation, deer habitat, and scenic resources; recommended to be included in the state park system.

*DOT&PF.* Ketchikan International Airport (including floatplane facilities) is currently leased to the Borough. The area immediately outside the developed airport site is the Airport Reserve zone. The Airport Reserve zone is designated for future airport-related uses. Beyond the Airport Reserve zone is the Airport Development zone, which is designated for auxiliary airport facilities such as parking lots, hotels, rental cars businesses, and other lands uses, although it

[1] *Ketchikan Gateway Borough Planning Department. 1996.* Ketchikan Gateway Borough Comprehensive Plan.

[2] *Alaska Department of Natural Resources, November 2000. Central and Southern Southeast Area Plan for State Lands*

currently remains largely undeveloped. Use of Airport Development land is subject to Borough and State of Alaska review and approval.[3]

*Ketchikan Gateway Borough.* Borough-owned lands are located along the east side of Gravina Island on the north, west, and south sides of the Ketchikan International Airport lands. These areas are currently included in the Borough's comprehensive planning effort known as Ketchikan 2020 (see Section 3.1.2.4). The Borough is developing specific development strategies for all of the east side of Gravina Island, exclusive of any USFS lands. A timber processing plant and related industrial sites are north of the airport on lands leased from the Borough.

*Alaska Mental Health Trust Authority.* The State of Alaska Mental Health Trust land within the project area is generally west of airport reserve land. Specific management plans have not yet been developed for this land; however, revenue generation is the main objective of Alaska Mental Health Trust land. A large portion of the Alaska Mental Health Trust land is located inland, extending west to California Ridge and east to the airport reserve land. Alaska Mental Health Trust land also includes smaller areas of land on the southern and northernmost portions of the project area on Gravina Island. The Alaska Mental Health Trust land is zoned by the Borough for "future development."[4]

*University of Alaska.* The University of Alaska lands are undeveloped parcels on the southwest side of Blank Inlet and on the west side of Vallenar Bay.[5]

*Private.* Private lands at Clam Cove are designated for residential use (approximately 38 parcels, both developed and undeveloped). Outside the immediate project area at Vallenar Bay, on the northwestern part of the island, and at Seal Cove in the southern portion of the island, there are other developed and undeveloped private lands. Developed private lands on Gravina Island are generally residences or recreation cabins.

#### 3.1.1.4 Tidal and Submerged Lands

Tidal and submerged lands associated with Tongass Narrows are used for marine boat and floatplane operations. Tidelands and submerged lands are under a mix of DNR and Ketchikan Gateway Borough ownership. Many of the parcels have been leased for private development.

### *3.1.2 Land Use Plans and Policies*

The Ketchikan Gateway Borough is the planning authority for the study area. The adopted plans with authority to govern land use decisions within the project area are the *Pennock and Gravina Island Neighborhood Plan,* 1985*;* the *Coastal Management Program,* 1984 (updated in 1989); and the *Ketchikan Gateway Borough Comprehensive Plan*, 1996.[6] The Borough is

[3] *Alaska Department of Transportation and Public Facilities. November 2002. Ketchikan International Airport Master Plan (Draft Final Report).*

[4] *Ketchikan Gateway Borough Planning Department. 1996.* Ketchikan Gateway Borough Comprehensive Plan.

[5] *Ketchikan Gateway Borough Assessment Office, 2001- 2003*

[6] *Ketchikan Gateway Borough Planning Department:* Pennock and Gravina Island Neighborhood Plan*, 1985;* Coastal Management Program, *1984; and* Comprehensive Plan*, 1996.*

currently engaged in a comprehensive planning effort known as *Ketchikan 2020*, which consists of the *Gravina Island Development Plan*, updates of the 1996 *Comprehensive Plan* and 1989 *Coastal Management Program*, and a *Wetland Development Plan*. The *Ketchikan International Airport Master Plan* was adopted by the Borough May 5, 2003. Descriptions of these plans and policies and their relevance to the Gravina Access Project are provided in the following sections.

#### 3.1.2.1 Pennock and Gravina Island Neighborhood Plan

The *Pennock and Gravina Island Neighborhood Plan*, produced by the Borough in 1985, set up a framework for the development of the lands on Gravina and Pennock Islands. Although now outdated, it is the most recently adopted plan specific to Pennock and Gravina Islands. *Ketchikan 2020* is assumed to supersede the Gravina Island portion of that plan. The plan was written at a time when considerable economic and population growth was anticipated in Ketchikan as a result of mineral development. That mineral development did not occur, and the growth of Ketchikan was not consistent with the assumptions of the plan, so the plan may not reflect current thinking of the planning department, elected officials, or residents. For this reason, there were public meetings for this project held specifically to focus on Pennock and Gravina Island residents.

One objective of the plan was to develop a transportation system that would provide access to interior land without compromising the qualities that attracted residents to the area. The plan clearly articulated a vision for future transportation access that would include a ferry. Regarding a bridge, the plan states: "Hard access by bridge or tunnel from Pennock to Gravina Island is not envisioned in the foreseeable future and, in light of the rural characteristics, should not be pursued. Hard access and its possible location is of concern to the community as a whole and should be determined by a Borough-wide vote" (page 26). (Note that a Borough vote was taken October 1, 2002 regarding use of Borough land for a bridge to Gravina Island, but not specifically addressing Pennock Island).

#### 3.1.2.2 Coastal Management Program

The *Coastal Management Program* was originally prepared in 1984 and was updated in 1989. The plan is part of the Alaska Coastal Management Program and contains policy guidance regarding the use and protection of coastal resources. The plan provides specific guidance regarding access to Gravina, discussing the need for improved access to Gravina Island, and identifying a hard link (bridge) as the solution supported by the plan. The purposes of the hard link, according to the plan, are:

- Airport development
- Access to commercial and industrial waterfront property
- Access to Borough land selections
- Access to developable land close to the city center
- Mutual aid opportunities for fire and police services
- Improved airfreight service to the business community

#### 3.1.2.3 Ketchikan Gateway Borough Comprehensive Plan

The *Comprehensive Plan* lays out issues and strategies for development in the Borough. Under the topic of "Economic Development," the goal is to "expand and diversify the local economy" and the number 1 strategy is "Gravina Island Development." Under the topic of "Transportation," the goal is "Ensure Adequate Access," and the number 1 strategy is "Bridge." The number 2 strategy is "Enhance Ferry Access." This plan also discusses a shortage of commercial and industrial land, and envisions that Borough holdings of land on Gravina and Pennock Islands would be used to meet the demand. The plan indicates that "expanding the community's land base to any extent, however, is dependent on providing roaded access to it, in this case, a hard link."

#### 3.1.2.4 Ketchikan 2020

The Borough's *Ketchikan 2020* planning effort is an in-progress program to develop or update four planning documents in the Borough:

- *Gravina Island Development Plan*
- Update of the Borough's 1984 *Coastal Zone Management Plan*
- *Wetland Development Plan*
- Update of the Borough's *Comprehensive Plan*

The Borough has published a draft *Gravina Island Development Plan*. (See Figure 3.4 for the Gravina Island Area Plan map.) This draft plan allows residents to consider opportunities for developing Gravina Island in tandem with selection of the preferred alternative for improving access to the island. The plan also provides a discussion of general issues and policies pertaining to the island. To date, only an internal Borough draft of the *Coastal Zone Management Plan* update has been prepared. The Borough has developed a work plan for completing the *Wetland Development Plan*. The Borough has not started its update of the *Comprehensive Plan.*

#### 3.1.2.5 Ketchikan International Airport Master Plan

The DOT&PF has recently revised the *Ketchikan International Airport Master Plan*. The master plan update considers how the airport will need to develop to accommodate future growth, and outlines changes in operations over a 20-year time period (through 2018). Key components of the master plan update most pertinent to the Gravina Access Project include: parking additions and a terminal area, and apron and taxiway expansion and improvements. The two key projects in the plan call for completion of a parallel taxiway along the north side of Runway 11 and an upgrade of the runway safety area to be accomplished by shifting the runway 800 feet. This shift will create 1,000 feet of safety area at the northwest end without requiring significant in-water fill. The project would also build 1,000 feet of runway safety area beyond the shifted runway at the southeast end.

## 3.2 FARMLAND

There is no farmland in the project area that is considered prime or unique, or is of statewide or local importance.

## 3.3 SOCIAL ENVIRONMENT

### *3.3.1 Population and Social Groups*

#### 3.3.1.1 Ketchikan Gateway Borough

In the past few years, the economy of the Ketchikan Gateway Borough has undergone many changes that have affected growth and population in the community.[7] Figure 3.5 illustrates population fluctuations from 1990 to 2000. Population increased annually from 1990, reaching a peak of 14,764 in 1995, and then began to decrease until a slight increase occurred between 1999 and 2000. From 1990 to 2000, the overall population increase of the Ketchikan Gateway Borough was 1.8%—from 13,828 people in 1990 to 14,070 people in 2000. However, estimates by the Alaska Department of Labor and Workforce Development prepared in January 2003 indicate that the July 2002 population of the Borough had declined slightly to 13,670.

Currently, roughly 275 active duty and civilian employees work at the USCG facility in Ketchikan. There are another nine active duty and civilian employees that work off base in town. On average, the number of USCG personnel that actually live on base is 20[8].

#### 3.3.1.2 Minority and Low-Income Populations

Based on 2000 U.S. Census Bureau race and income data, 26% of the population in the Ketchikan Gateway Borough is minority (more than one race or a single race other than white). Table 3-1 and Figure 3.6 show the minority population breakdown by areas of Borough known as Census Block Groups. The block groups cover a smaller area in the populated Ketchikan-Saxman area and a quite large area elsewhere in the Borough. The block group with the greatest minority population is in Saxman and is 47% minority. The City of Saxman itself, a subset of this block group, is approximately 70% Alaska Native. Other minority populations in the Borough include Asian, black, Native Hawaiian, and Hispanic. The median household income in the Borough is $51,344 per year. Table 3-2 and Figure 3.7 provide a breakdown of median household income by block group. Field visits, discussion of these topics with Borough planning staff,[9] and public meetings held for the project confirm that there are no pockets of predominantly minority or low-income populations in the immediate vicinity of any of the alternatives.

[7] *DOT&PF,* Gravina Access Project Social Environment Technical Memorandum*, prepared by HDR, November 2001*

[8] *Commander Anthony Palazzetti, USCG in Ketchikan, email to Kristen Maines, HDR, June 19, 2003.*

[9] *John Hill, Ketchikan Gateway Borough Planning Department, personal communication with Kristen Maines, HDR, 2001.*

**TABLE 3-1**
**2000 U.S. CENSUS POPULATION IN ALASKA AND THE KETCHIKAN GATEWAY BOROUGH**

| *Area* | *Total Population* | *Minority or Mixed Race* | *Percent Minority or Mixed Race* |
|---|---|---|---|
| **Alaska** | **626,932** | **192,707** | **30.74%** |
| **Ketchikan Gateway Borough** | **14,070** | **3,676** | **26.13%** |
| Block Group 1, Census Tract 1 | 1,317 | 142 | 10.78% |
| Block Group 2, Census Tract 1 | 906 | 79 | 8.72% |
| Block Group 3, Census Tract 1 | 1,192 | 125 | 10.49% |
| Block Group 4, Census Tract 1 | 396 | 48 | 12.12% |
| **Census Tract 1 Total** | **3,811** | **394** | **10.34%** |
| Block Group 1, Census Tract 2 | 2,350 | 733 | 31.19% |
| Block Group 2, Census Tract 2 | 2,548 | 795 | 31.20% |
| **Census Tract 2 Total** | **4,898** | **1,528** | **31.20%** |
| Block Group 1, Census Tract 3 | 1,071 | 498 | 46.50% |
| Block Group 2, Census Tract 3 | 1,165 | 344 | 29.53% |
| Block Group 3, Census Tract 3 | 788 | 317 | 40.23% |
| **Census Tract 3 Total** | **3,024** | **1,159** | **38.33%** |
| Block Group 1, Census Tract 4 | 1,086 | 451 | 41.53% |
| Block Group 2, Census Tract 4 | 1,251 | 144 | 11.51% |
| **Census Tract 4 Total** | **2,337** | **595** | **25.46%** |

*[1] Minority or Mixed Race indicates census respondents who describe themselves as a race other than white, or indicating more than one race.*

*Source: U.S. Census Bureau (http://www.census.gov/), 2002.*

Median household income data is based on census data for household income and earnings for 1999. Household income is generally used as the basis for determining poverty. The "median" for a block group (or any area) is the household income for which there are as many households with a greater income as there are with a lower income. The data presented allows comparison of the median income in the census block groups to the median income in Alaska and in the Ketchikan Gateway Borough.

**TABLE 3-2**
**2000 U.S. CENSUS BUREAU MEDIAN HOUSEHOLD INCOME**

| *Area* | *Median Household Income in 1999 ($)* |
|---|---|
| **Alaska** | **51,571** |
| **Ketchikan Gateway Borough** | **51,344** |
| Block Group 1, Census Tract 1 | 61,989 |
| Block Group 2, Census Tract 1 | 55,469 |
| Block Group 3, Census Tract 1 | 63,594 |
| Block Group 4, Census Tract 1 | 51,750 |
| **Census Tract 1** | **60,109** |
| Block Group 1, Census Tract 2 | 47,250 |
| Block Group 2, Census Tract 2 | 55,865 |
| **Census Tract 2** | **50,214** |
| Block Group 1, Census Tract 3 | 38,155 |
| Block Group 2, Census Tract 3 | 35,607 |
| Block Group 3, Census Tract 3 | 40,250 |
| **Census Tract 3** | **36,574** |
| Block Group 1, Census Tract 4 | 60,455 |
| Block Group 2, Census Tract 4 | 59,271 |
| **Census Tract 4** | **59,750** |

*Source: U.S. Census Bureau (http://www.census.gov/), 2002.*

The lowest median household income of block groups in the Borough is $35,607 (Block Group 2, Census Tract 3). Considering the average household size in the Ketchikan Gateway Borough is 2.56 persons, this figure is nearly twice what the U.S. Department of Health and Human Services identifies as the poverty level for a family of three in Alaska (i.e., $17,690 or less in 2000; see Table 3-3). Poverty guidelines for all states are included in Table 3-3 to provide a comparison to Alaska poverty guidelines. The U.S. Department of Health and Human Services poverty guidelines are a simplified version of the U.S. Census Bureau's statistical poverty thresholds used to prepare its statistical estimates of the number of persons and families in poverty.

**TABLE 3-3**
**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES POVERTY GUIDELINES FOR 2000**

| *Size of Family Unit* | *48 Contiguous States and D.C. ($)* | *Alaska ($)* | *Hawaii ($)* |
|---|---|---|---|
| 1 | 8,350 | 10,430 | 9,590 |
| 2 | 11,250 | 14,060 | 12,930 |
| **3** | 14,150 | **17,690** | 16,270 |
| 4 | 17,050 | 21,320 | 19,610 |
| 5 | 19,950 | 24,950 | 22,950 |
| 6 | 22,850 | 28,580 | 26,290 |
| 7 | 25,750 | 32,210 | 29,630 |
| 8 | 28,650 | 35,840 | 32,970 |

*Source: Federal Register, Vol. 65, No. 31, February 15, 2000, pp. 7555-7557*

*Note: Bold indicates data for approximate average household size in Ketchikan.*

### *3.3.2 Community Character*

In the Ketchikan Gateway Borough 1996 *Comprehensive Plan*, the community design section states that:

> *The character of a community is a result of both the natural and manufactured environment. The natural setting, because of its vastness and public ownership, will probably not change significantly over time. However, the urban fabric is subject to constant change in response to market demands and public investment decisions.*

The 1996 plan indicated a need for preserving neighborhood characteristics—such as neighborhood cohesiveness, aesthetics and appearance, and historical importance—through design review guidelines. In Ketchikan, according to the plan, the defining community characteristics are open space and scenic views, pedestrian access and circulation, community art and beautification, and cultural features and historic preservation.

#### 3.3.2.1 Revillagigedo Island

The City of Ketchikan is the largest collective community on Revillagigedo Island. Residents of the City of Ketchikan value the quality of life their community provides, and many residents especially value the qualities that make their community and neighborhoods unique. Ketchikan is a small city where many of the people know each other and where residents value the intimate feel of their hometown.

Revillagigedo Island neighborhoods within the immediate vicinity of the project alternatives include:

- A commercial area at Signal Road and a small residential neighborhood along Baker Street North and Bucey Avenue North (Alternatives C3[a/b] and C3[b]). Baker Street

North and Bucey Avenue North are dead-end streets with single-family homes of varied construction on different sized lots.

- The Cambria Drive neighborhood (Alternatives C4 and D1), with large cul-de-sac lots and newly built, single-family homes of similar construction and style.
- The Forest Park neighborhood (Alternative F1) residential area, with single and multi-family housing units and a mixture of older and newer homes, located just south of the city limits of Ketchikan.

Saxman is incorporated as a second-class city and is located about 2 miles southeast of Ketchikan . It lies across the East Channel from Pennock Island. It was settled by Tlingit people in 1894 and today still has a high Alaska Native population. It functions as a part of greater Ketchikan, but is also the seat of the Organized Village of Saxman, a tribal government, and it is designated a rural community under federal subsistence management rules. Subsistence is an important socioeconomic element for Saxman. Among other community buildings, there is a totem pole carving center, which is culturally important and attracts tourists. The population of the city itself is approximately 400.

#### 3.3.2.2 Pennock and Gravina Islands

The *Pennock and Gravina Island Neighborhood Plan*[10] illustrates that these residents value their sense of community and their existing way of life. Many residents of these islands are former residents of the City of Ketchikan and were attracted to the islands by their rural and more self-sufficient life style.

A special workshop for Pennock and Gravina Island residents was held May 23 and 24, 2001, to obtain input on the existing *Pennock and Gravina Island Neighborhood Plan* and current planning activities (i.e., *Ketchikan 2020*), particularly with respect to the bridge alternatives under consideration (see Appendix B). A summary of the 1985 *Pennock and Gravina Island Neighborhood Plan* was mailed to residents and they were asked to be prepared to discuss what has changed from the 1985 plan, what has stayed the same, and what development they would like to see in the future. A summary of the comments offered by participants is presented below:

- Comments were offered both in opposition to and support of a Pennock Island Alternative.
- Some residents said that they would like to have access from Pennock Island to Ketchikan and Gravina Island, with a ferry or bridge to provide access to/from Clam Cove.
- Comments were also offered by some Pennock Island and Clam Cove residents that there may not be a need now, but at some point in their lives they may want improved, relatively quick, and easy, access to Ketchikan or the airport (by road). Interest was also expressed in providing access to North Gravina Island.

[10] *Ketchikan Gateway Borough Planning Department, 1985.*

- Other residents expressed general opposition to a Pennock Island Alternative. They felt that a bridge and associated roads would change the rural and isolated nature of the island.
- A comment was made that Pennock Island residents can already get to the airport in 15 minutes (by skiff), and that access to Ketchikan (and Revillagigedo Island) was a bigger concern to the residents.
- Residents of Clam Cove in attendance at the meetings were supportive of improved access, either from a Pennock Island Alternative or other improved-access alternative with a road extension to the south. There was general support from Clam Cove residents to move the proposed road closer to the waterfront property to make tying into the road easier from each of the lots.
- There was considerable discussion of how Pennock Island or Clam Cove residents would have access to a bridge. For example: Would there be a network of roads on Pennock Island? How many access points would there potentially be? Would this lead to secondary development on Pennock Island?

### *3.3.3 Community and Public Facilities*

The Borough, City of Ketchikan, and City of Saxman provide an array of community services to the public.[11] These are summarized in the following paragraphs. Those facilities located within the project area are shown in Figure 3.8.

#### 3.3.3.1 Libraries

The Borough has nine libraries: one public library, six school libraries, one college library, and one law library (for reference only). There are no libraries in Saxman.

#### 3.3.3.2 Schools

There are five elementary schools in the Borough, one middle school, two high schools, and two other programs with a total of 2,372 students as of April 25, 2003. The University of Alaska, Southeast has an academic campus and a technical center, both in Ketchikan. There are no schools located directly in Saxman.

#### 3.3.3.3 Police Services

The City of Ketchikan and City of Saxman each operate a police department serving residents within their own city limits. The Alaska State Troopers are based on Revillagigedo Island approximately 2 miles north of the airport ferry terminal, and serve residents outside of the city limits.

[11] *Alaska Department of Community and Economic Development (DCED) Community Information Database Online, <www.dced.state.ak.us/mra/CF_COMDB.htm>, 2001.*

#### 3.3.3.4 Fire Protection and Emergency Response

Ketchikan staff and volunteers, along with local volunteer fire departments run by the Borough service areas, provide fire protection and emergency response services to businesses and residents living on the portion of Revillagigedo Island accessible by road. In addition, the City of Saxman has a fire unit. There are seven Borough fire stations located throughout the Borough. All are staffed by volunteers, except the fire station on Main Street in downtown Ketchikan. The average response time (for all service areas) by the city fire station and emergency medical service is approximately 4 minutes. The volunteer squads are used as needed.

Emergency services are not provided to residents living beyond the road system or on Pennock and Gravina Islands, as they are outside the designated service areas. The airport has its own rescue and fire-fighting personnel. However, there is a cooperative emergency response system between Ketchikan and the airport (particularly for people brought by air [medevac] to the Ketchikan hospital), using the ferry. If there is a medevac during normal hours of ferry operations, the ferry schedule is interrupted. Emergency responders are given priority and ferried across the narrows as quickly as possible. After hours, the hospital or other emergency response team calls the ferry operator, and the ferry is put into operation to move emergency responders across Tongass Narrows. Other emergency marine response in Alaska generally falls to the USCG and Alaska State Troopers.

#### 3.3.3.5 Health Care Facilities

Local hospitals and health clinics are the Ketchikan General Hospital, the Southeast Alaska Regional Health Consortium Clinic, the Gateway Center for Human Services, and the USCG Ketchikan Dispensary. The hospital is a qualified acute care facility and medevac facility. The USCG facility provides emergency support only and is a qualified emergency care center. Saxman uses the Ketchikan health care facilities.

### *3.3.4 Recreation Resources*

The City of Ketchikan has numerous parks, trails, and recreation areas, as well as tennis courts, playing fields, and indoor recreation centers. Saxman has a gym in its community center. Fishing, hunting, hiking, and cycling are popular activities throughout Revillagigedo Island. Hiking trails (Figure 3.8) and USFS logging roads provide access to remote areas on Gravina Island. Tongass Narrows is popular for recreational boating and fishing. Gravina Island offers fishing, hunting, shellfish gathering, and hiking, with accessibility along the shoreline and on primitive trails. Dall Bay State Marine Park, a boat-accessible park, is located at the southern end of Gravina Island. A USFS public use recreational cabin is also on the southern end of the island. While there is no specific Borough trails plan, the draft *Gravina Island Development Plan* (Ketchikan Gateway Borough Planning Department, April 2002) discusses the location of existing and development of new recreation resources, such as hiking and kayak trails, lodges and cabins, backcountry wilderness experiences, nature walks, and improved access to Bostwick Lake and Gravina Island streams for fishing. Pennock Island is accessible by boat and is used for hunting and fishing, but there are no developed recreation facilities on the island. Section 3.8 provides more information on pedestrian and bicyclist corridors as transportation facilities.

From 1990 to 2000, the number of deer hunters in the greater Revillagigedo Island area (Game Management Unit 1A) decreased by 26 percent (from 1,009 hunters to 747 hunters), and the

number of hunter days decreased by 29 percent (from 5,127 days to 3,644 days).[12] From 1990 to 2001, the total number of fishing (angler) days decreased by 11 percent (from 91,127 days to 80,916 days).[13, 14]

### *3.3.5 Accessibility*

Natural features and limited infrastructure constrain the accessibility and means of travel to various locations on Gravina Island within the project area. Currently, access to developable land is not possible because there is no road from the existing airport ferry to developable lands. The Borough is planning limited road access from the existing ferry to lands north of the airport.

A stated need for the Gravina Access Project is to improve access to Ketchikan International Airport and to other lands on Gravina Island. One measure of accessibility is the amount of time it takes to travel from one point to another. Existing travel times were calculated for travel between nine origin points on Revillagigedo Island and the airport terminal on Gravina Island. All of the routes were analyzed for vehicular travel times, and three of these routes were analyzed for trips taken by pedestrians and bicycles. Table 3-4 presents the travel times calculated for these nine routes under existing conditions.

*[12] Porter, Boyd. 2001. Unit 1A Deer management report. Pages 1-19 in M. V. Hicks, editor. Deer management report of survey and inventory activities 1 July 1998–30 June 2000. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration Grants W-27-2, W-27-3. Proj. 2.0. Juneau, Alaska*

*[13] Walker R. J., et al. 2003. Participation, catch, and harvest in Alaska sport fisheries during 2000. Alaska Department of Fish and Game, Fishery Data Series No. 03-05, Anchorage* on *www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm.*

*[14] Hoffman, Steve. April 16, 2003. Personal communication. Telephone conversation between ADF&G Sport Fish Division and Kristen Maines, HDR Alaska, Inc. for 2001 data*

**TABLE 3-4**
**TRAVEL TIMES* FROM REVILLAGIGEDO ISLAND TO KETCHIKAN INTERNATIONAL AIRPORT**

| *Origin (on Revillagigedo Island)* | *Travel Mode* | *Travel Time* (in minutes) to the airport terminal on Gravina Island* |
|---|---|---|
| Downtown Saxman (Fire Station) | Vehicles | 32 |
| Hospital | Emergency Vehicles | 21 |
| Peninsula Point Fire Station | Emergency Vehicles | 22 |
| Alaska Marine Highway Fire Station | Emergency Vehicles | 23 |
| Main Street Fire Station | Emergency Vehicles | 25 |
| Point Higgins | Vehicles | 32 |
| Downtown Ketchikan (Mile Post 0) | Vehicles | 27 |
| | Pedestrians | 76 |
| | Bicycles | 37 |
| Ward Cove (Post Office) | Vehicles | 25 |
| | Pedestrians | 111 |
| | Bicycles | 47 |
| Carlanna Creek | Vehicles | 19 |
| | Pedestrians | 21 |
| | Bicycles | 20 |

* *The calculation of travel times is based on the length of roadway traveled and the average speed of vehicles, pedestrians, and bicycles on that roadway. The average speed of vehicles was assumed to be 5 miles per hour (mph) slower than the posted speed limit (except for emergency response vehicles, for which the average speed was assumed to be the posted speed limit). The average speed for pedestrians was assumed to be 3 mph and for bicyclists 10 mph. Ferry time, based on scheduled summer ferry service every 15 minutes, was assumed to be 19 minutes, including 15 minutes for waiting/loading/unloading and 4 minutes for transit. Because of variations in ferry waiting time and traffic, actual travel times may vary.*

### *3.3.6 Environmental Justice*

Executive Order 12898[15] states:

> *Each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.*

The Federal Highway Administration (FHWA) order "FHWA Actions To Address Environmental Justice in Minority Populations and Low-Income Populations"[16] contains the following definitions:

[15] Federal Register, *February 11, 1994.*

[16] *FHWA, Order on FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, December 2, 1980.*

- Low-Income: A household income at or below the poverty guidelines of the U.S. Department of Health and Human Services

- Minorities:
  - Black (having origins in any of the black racial groups of Africa)
  - Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race)
  - Asian-American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands)
  - American Indian or Alaskan Native (having origins in any of the original people of North America and who maintain cultural identification through tribal affiliation or community recognition)

The FHWA order also defines a "disproportionately high and adverse effect on minority and low-income populations" as follows:

> *An adverse effect that is predominantly borne by a minority population and/or a low-income population; or will be suffered by the minority population and/or low-income population, and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population*.

The demographic information for the project area is described above in Section 3.3.1.

### *3.3.7 Subsistence*

Subsistence is defined in the Alaska National Interest Lands Conservation Act, Section 803, as "the customary and traditional uses by rural Alaska residents of wild, renewable resources" for non-commercial purposes. Hunting, fishing, trapping, and gathering natural resources are major elements of the cultural and economic life of many Ketchikan-area residents. However, much of the Ketchikan area is not considered rural[17].

Residents of Saxman itself are considered rural residents. Ocean resources (such as fish, abalone, clams, and seaweed) and forest resources (such as berries, birds, eggs, and various land mammals) provide them with a rich and varied diet. Subsistence activities are also important to follow cultural customs and traditions (including handcrafts), and to supplement personal income. Pennock Island (in the project area) and the Bostwick Bay, Inlet, and Creek area on southeastern Gravina Island (outside the project area) are popular subsistence areas. In 1999, 80% of the residents of Saxman engaged in subsistence harvesting in these areas and the surrounding region, and almost all of them (97%) used subsistence products. The per-capita subsistence harvest was estimated at 217 pounds per person, and included roughly 130 pounds of fish (84 pounds of salmon and 47 pounds of other fish), 29 pounds of land mammals, 12 pounds of marine mammals, 23 pounds of vegetation, and 23 pounds of marine

*[17] The following sub-areas are considered not rural: Clover Pass, Herring Cove, Ketchikan City, Ketchikan East, Mountain Point, North Tongass Highway, parts of Pennock Island, and Saxman East. This encompasses residents of the entire east side of Tongass Narrows from Behm Canal to George Inlet, except for Saxman itself, according to public information posted by the U.S. Fish and Wildlife Service on its subsistence web site in May 2003 (www.r7.fws.gov/asm/regs01/apply.pdf).*

invertebrates (Alaska Department of Fish and Game, Division of Subsistence, Household Survey, 2000).

## *3.3.8 Utilities*

### 3.3.8.1 Water

**Ketchikan and Airport, and Saxman**

Ketchikan Public Utilities (KPU) provides potable water to almost all developed areas within the City of Ketchikan on Revillagigedo Island and to the airport on Gravina Island. KPU's main water distribution system for the City of Ketchikan delivers up to 500 gallons per person per day. The system consists of three tanks and more than 21 miles of pipe ranging from 2 to 16 inches in diameter. KPU provides water to the airport on Gravina Island through an underground and submarine main line.

The primary sources of KPU water are Ketchikan and Carlanna Lakes; if additional water is needed, it is supplied from Whitman Lake and the Water Lake watershed. The KPU system has the capacity to provide water outside the city limits, but it does not have a distribution network to handle the volume and pressure loads that a regional system would require.

Saxman has a small piped water system for its residents. It includes a reservoir and treatment system.

Other water resources on Gravina Island include Bostwick Lake, which has a watershed of approximately 1.7 square miles. If needed, this and several smaller lakes on Gravina Island could serve as future water sources. These are not now developed in any way.

**Other Areas**

Except for the airport, in areas of the Borough outside of the City of Ketchikan and City of Saxman, property owners are responsible for their own water systems. Most homes and small businesses, including those on Pennock and Gravina Islands, depend on rooftop catchment systems for their water supply; during dry months, tanker trucks deliver water from KPU to customers in areas accessible by road. Some residents have wells.

### 3.3.8.2 Sewer

**Ketchikan, Airport, and Saxman**

Both the City of Ketchikan and the City of Saxman operate wastewater systems, including collector lines and treatment plants. Ketchikan's sewage treatment plant has a capacity of 7.0 million gallons per day, and currently treats about 1.5 million gallons in an average day and approximately 4.0 million gallons per day during peak flows in wet weather. This kind of increased flow is not uncommon in Southeast Alaska. Saxman's treatment system has a capacity of 115,000 gallons per day. The airport operates its own sewer system.

**Other Areas**

Owners of properties on Pennock and Gravina Islands, and outside the service areas of Ketchikan and Saxman, are responsible for their own sewer systems. It is assumed that most

have septic tanks and leach fields. In outlying areas, there may be some direct discharge to the ocean or use of pit toilets.

#### 3.3.8.3 Electricity

KPU provides electricity to the Ketchikan area, including the City of Ketchikan, the City of Saxman, Gravina Island, and Pennock Island. Portions of Gravina and Pennock Islands are served by submarine cable. KPU has an annual average energy generation of about 65 million kilowatt-hours (kWh) from several hydroelectric projects. It also purchases power produced at the Swan Lake Project, which produces about 76 million kWh per year. In addition, KPU owns diesel generators capable of generating an additional 100 million kWh per year.

The total power currently available to KPU is about 241 million kWh per year. Power usage from this system is currently about 55 percent of the generating capacity (about 133 million kWh per year).

#### 3.3.8.4 Telephone

KPU Telecommunications (one of three divisions of KPU) currently has over 11,000 lines to subscribers on Revillagigedo Island and Gravina Island. The telephone system includes service to Ketchikan International Airport by submarine cable. There is no service to Pennock Island.

## 3.4 RELOCATION

As a means of providing uniform and equitable treatment for those persons displaced, the government passed the ”Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970,” and the ”Uniform Relocation Act Amendments of 1987.” This legislation provides for uniform and equitable treatment of persons displaced from their homes, businesses, or farms by federal and federally assisted programs and establishes uniform and equitable land acquisition policies for federal and federally assisted programs. Whenever acquiring real property for a program or project by a federal agency results in displacing anyone, the agency is required to reimburse displaced persons and provide relocation planning, assistance coordination, and advisory services.

Residents displaced by a federal program generally are relocated to existing housing in the community, although they may have to locate elsewhere in the community. Businesses are generally relocated to similar business settings. The cost of relocating is covered as part of the relocation process. In accordance with the law, all owners of acquired property, without discrimination, are compensated for their loss of property at fair market value and all displaced persons are moved at no expense to them.

There are homes and businesses that may be affected by the project, as further discussed below and in Chapter 4. All alternatives would affect airport property on Gravina Island. Vacant housing and business sites are generally available in Ketchikan, should relocation be required.

Alternatives C3(a) and C3(b) may affect the property of a bank and a car dealership at the intersection of Tongass Avenue and Signal Road. Along the hillside parallel to Tongass Avenue, these alternatives may affect residential property along Baker Street North and Bucey Avenue North. At the location of the alignment crossing Tongass Avenue, a residence would likely be affected.

The proposed intersection of Alternative C4 and Tongass Avenue may affect residential property on Tongass Avenue. The right-of-way would traverse the hillside parallel to Tongass Avenue for approximately 0.5 mile, crossing through Ketchikan Ready Mix Quarry property and through the Dawson Construction Company property.

For Alternative D1, a small amount of land on the south side of Cambria Drive may be affected. The right-of-way would traverse the hillside parallel to Tongass Avenue, north of the Cambria neighborhood, for approximately 0.3 mile, crossing through the Dawson Construction Company property and west of the Carlanna Construction quarry operations.

Alternative F1 would connect with Tongass Avenue south of Tatsuda's grocery store in the vicinity of the existing rock quarry. The road would pass east of a tank farm, a cemetery, and the USCG Station, and north of Forest Park Subdivision. Alternative F1 may affect some commercial property on Revillagigedo Island and some vacant, private residential property on Gravina Island. It would affect Alaska Mental Health Trust land and USCG land.

Alternative F3 would traverse undeveloped areas on Revillagigedo, Pennock, and Gravina Islands. The proposed alignment of Alternative F3 may affect vacant, private residential property on Gravina Island.

Alternative G2 would place the new ferry terminal and parking facilities on Peninsula Point at the existing location of a Pro Mech aircraft hangar. Access to the ferry terminal from Tongass Highway may affect commercial property adjacent to the highway.

Alternative G3 would involve construction of a ferry terminal and parking facilities at the current location of a gas station, a fast-food restaurant (Burger King), and the Gateway City Realty building, which currently has three businesses as tenants.

Alternative G4 would involve construction of a ferry terminal and parking facilities adjacent to the existing airport ferry terminals on both Revillagigedo and Gravina islands.

## 3.5 ECONOMIC ENVIRONMENT

### *3.5.1 Employment and Earnings*

The number of jobs in the Ketchikan Gateway Borough increased dramatically from 1980 to 1990, and then, after a decline in the number of jobs in the early 1990s, peaked at about 7,315 jobs in 1996. After the closure of the Ketchikan pulp mill in 1997, employment declined to about 7,000 jobs in 2001. Total earnings were $225,253,607 and annual average monthly earnings were $2,677 in 2001 (see Table 3-5). Growth in the tourism industry and the decline in the forest products industry have accounted for most of the changes in Ketchikan’s economy over the last decade. The primary locations of major employers in the project area and their 2002 average monthly employment levels are illustrated in Figure 3.9.

**TABLE 3-5**
**EMPLOYMENT AND EARNINGS IN THE KETCHIKAN GATEWAY BOROUGH, 2001**

| *Industrial Classification* | *Annual Average Monthly Employment (jobs)* | *Yearly Earnings ($)* | *Annual Average Monthly Earnings ($)* |
|---|---|---|---|
| Agriculture, Forestry, and Fishing (i.e., harvesting) | 65 | 2,598,012 | 3,331 |
| Construction | 389 | 19,763,079 | 4,234 |
| Manufacturing (includes seafood processing and forest products) | 944 | 32,408,949 | 2,861 |
| Transportation, Communication, and Utilities | 535 | 20,719,065 | 3,227 |
| Wholesale Trade | 149 | 4,805,719 | 2,688 |
| Retail Trade | 1,364 | 26,850,081 | 1,640 |
| Finance, Insurance, and Real Estate | 281 | 8,679,399 | 2,574 |
| Services (includes hotels and restaurants) | 1,388 | 37,086,124 | 2,227 |
| Federal Government | 255 | 12,702,847 | 4,151 |
| State Government | 567 | 21,847,340 | 3,211 |
| Local Government | 1,074 | 37,792,991 | 2,932 |
| **Total Industries** | **7,011** | **225,253,607** | **2,677 (average)** |

*Source: Alaska Department of Labor and Workforce Development, 2003 (http://almis.labor.state.ak.us/).*

## *3.5.2 Major Employment Industries*

### 3.5.2.1 Forest Products

The forest products industry has been an important part of the Southeast Alaska (and Ketchikan) economy for more than half a century. The industry cuts and processes Sitka spruce, hemlock, and other species and sells them as whole logs, lumber, and other products. Historically, a large proportion was exported to Asian buyers.

Harvest areas near Ketchikan have included both Revillagigedo and Gravina Islands. No timber sales have been in the immediate project area. On Gravina Island, harvests of the closest areas have been managed by the state and USFS along Vallenar Creek and at Vallenar Bay at the northern end of the island. Smaller timber sales have taken place at Phocena Bay and Bostwick Inlet on the south and east sides of the island. Altogether, a little more than 1,000 acres has been harvested on Gravina Island.[18] The Forest Service recently proposed substantial timber sales on Gravina Island, but the project is currently not progressing.

The *Tongass National Forest Land and Resource Management Plan* (USFS, 1997) substantially reduced allowable harvest levels; at the same time, most Asian markets experienced downturns in price and demand for logs, cants, and woodchips. Current Tongass National Forest harvest levels are at the same level as those in 1945, while log supplies from private lands have declined as owners converted their forests to second-growth. Harvest levels from federal lands in Alaska continue to decline, while log supplies from state lands have risen. From 1988 to

[18] *USDA Forest Service. January 2000. Gravina Island Timber Sale Draft Environmental Impact Statement.*

1998, the value of the industry's total international exports declined by 56.3 percent (from $475 million to $208 million), and the value of international exports of softwood logs declined by 27.8 percent (from $262 million to $189 million). The combination of market downturns and reduced harvest levels led to closure of the Sitka pulp mill in 1993 and the Ketchikan pulp mill in 1997.[19] Currently, Ketchikan has a modest sawmill on Gravina Island at Lewis Reef, north of the airport.

#### 3.5.2.2 Seafood

**Seafood Processing**

The largest period of seafood processing employment in Ketchikan is during the summer season, when millions of pounds of salmon are processed during a few months. From 1997 to 2000, gross annual earnings of the seafood processing industry (i.e., manufacturing of food and related products) in the Borough increased from approximately $10.4 million to $12.3 million, which constituted 4.4 to 5.4 percent, respectively, of the gross earnings of all industries in Ketchikan.[20]

**Commercial Fisheries**

Ketchikan commercial fisheries harvests consist largely of salmon and, to a lesser degree, halibut and sablefish. The relatively new sea cucumber and sea urchin dive fisheries have become a significant part of the commercial fisheries activity. Herring spawn on kelp remains a fairly large portion of the harvest, along with shrimp. Ketchikan commercial fisheries in 2000 accounted for approximately 9.5 percent of the employed labor force. Total gross earnings of Ketchikan residents involved in the commercial fish harvesting industry have declined since 1995, but with fewer permit holders, the average gross earnings per permit holder in 1999 and 2000 were comparable to those in 1995 and 1996. A large portion of the decline could be related to a diminishing per-pound value of salmon since the late 1980s.[21]

#### 3.5.2.3 Tourism

The tourism industry in Alaska generates substantial income for the state and generates employment in a variety of industries such as transportation, retail trade, and services. Nonresident visitors spent approximately $1.4 billion in Alaska in Summer 2001. The Ketchikan area has benefited from increased tourism in many ways, in terms of both spending and employment. From 1988 to 1998, the number of summer visitors to Ketchikan increased 137 percent, to almost 600,000. Most of these visitors are attributable to the cruise industry.

Average cruise ship passenger spending was estimated at $95 per day in 1999. Data collected by Cruise Line Agencies of Alaska show that nearly 691,000 cruise passengers visited Ketchikan in Summer 2001. Based on 1993 visitor spending data, local sales tax data, gross sales data, and other indicators, it was estimated that in 1999 the cruise industry in Ketchikan accounted for approximately $54 million in spending by cruise passengers in Ketchikan, more

[19] *Northern Economics, Inc. and HDR Alaska, Inc. April 2002. "Existing Conditions Demographic and Socioeconomic Analysis," Ketchikan 2020 and Gravina Access Project. Prepared for the Alaska Department of Transportation and Public Facilities.*

[20] Ibid.

[21] Ibid.

than $3 million by cruise ship crews, and $8.5 million in direct spending by cruise lines in 1999.[22]

Tourism is the primary factor determining employment in the trade and services sectors in the area. Employment in these two industries depends on growth in the number of visitors and their level of spending.

#### 3.5.2.4 Government

Government employment and spending play a major role in the Ketchikan area economy. In 2001, government jobs represented 27.0 percent of Borough employment—1,896 jobs: 255 of these jobs were Federal Government (3.6 percent), 567 were State Government (8.1 percent), and 1,074 were Local Government (15.3 percent).

#### 3.5.2.5 Transportation

Ketchikan is a regional transportation center for southern Southeast Alaska, and transportation services between Ketchikan and communities inside and outside of the region are a significant economic factor in the Borough.

**Ketchikan International Airport**

There were approximately 136 employees (full- and part-time) at the airport in the winter of 2001-2002 (including 10 permanent ferry workers), and 159 in the summer of 2002 (including 10 permanent and 4 temporary ferry workers). The airport and airport-related businesses have consistently been important employers in Ketchikan over the years. In addition, increased security measures and the creation of the Transportation Security Administration have created additional jobs at the Ketchikan International Airport.[23]

**Alaska Ship and Drydock, Inc.**

The Ketchikan shipyard has been an important part of Ketchikan's economy since the late 1970s. Early operators of the shipyard encountered difficulties, but Alaska Ship and Drydock, Inc. (ASD) became the shipyard operator in 1994 and has successfully increased the vessel repair and construction business. From 1994 to 2001, annual ASD gross revenue increased from $2.4 million to $20.0 million, and ASD employment also increased, from 21 to 149 employees.[24]

**Alaska Marine Highway System and Inter-Island Ferries**

The AMHS is another transportation employer in the Ketchikan area. From 1990 to 1999, AMHS regular, winter full-time employment decreased 4.6 percent, from 564 employees to 538 employees system-wide. Regular summer full-time employment increased 13.4 percent, from 582 employees to 660 employees throughout the AMHS. The Inter-Island Ferry Authority (IFA) began commercial vessel operations in early 2002. In its first months of operation (during the

[22] *The McDowell Group, Inc., 2000.*

[23] *Northern Economics, Inc. and HDR Alaska, Inc. April 2002. "Existing Conditions Demographic and Socioeconomic Analysis," Ketchikan 2020 and Gravina Access Project. Prepared for the Alaska Department of Transportation and Public Facilities.*

[24] Ibid.

winter), the IFA employed 24 persons; summer employment increased to 33.[25] Many of these jobs are in Ketchikan.

## 3.6 JOINT DEVELOPMENT

There are no joint development projects associated with the Gravina Access Project.

## 3.7 TRANSPORTATION

Because Ketchikan is on an island, transportation to and from the project area is based more on water and air transportation than on land-base transportation. Within the developed greater Ketchikan area, automobile and pedestrian facilities are important for day-to-day transportation.

Tongass Narrows provides a major northwest-southeast corridor for both boats and aircraft. Tongass Narrows is approximately 13 miles long and, at its narrowest point, is about one-fourth mile wide; it is bounded by the steep mountains of Revillagigedo Island on the northeast and by Gravina Island on the southwest. These natural features funnel aircraft and sea-going vessels into a narrow corridor, and require them to operate in close quarters.

As discussed in the remainder of Section 3.7:

- Figure 3.10 (Aviation Transportation Facilities) shows the locations of facilities for wheeled airplanes, floatplanes, and helicopters, and the extent of the protected airspace around the airport.
- Figure 3.11 (Ketchikan International Airport: Existing Conditions) shows the runway layout and facilities at the airport.
- Figure 3.12 (Marine and Land Transportation Facilities) shows the docks and other facilities for boats, ferries, cruise ships, and other ships, as well as the routes of the ferries and cruise ships. Figure 3.12 also shows the surface transportation routes for vehicles, pedestrians, and bicyclists.

### *3.7.1 Aviation*

Aviation operations in the Ketchikan and Tongass Narrows area are noteworthy because:

- The primary land-based aviation facility, Ketchikan International Airport, is on Gravina Island, across Tongass Narrows from the City of Ketchikan and the population base it serves.
- The generally steep topography of the islands bordering Tongass Narrows restricts aviation operations and facilities.
- Frequently, many aircraft (particularly floatplanes) operate concurrently in the relatively small and constrained airspace.
- Low-ceiling, low-visibility weather conditions often restrict aviation operations.

[25] Ibid.

In addition to the above conditions, federal aviation regulations specific to Ketchikan govern aviation operations in the project area.

#### 3.7.1.1 Ketchikan International Airport

The Ketchikan International Airport opened in 1974. It is owned by DOT&PF and operated under a lease agreement by the Borough.

**Existing Airport Facilities and Operations**

The airport has air and water access, but no land access. The main public access is via the airport ferry, which is operated by the Borough. The airport ferry crosses Tongass Narrows directly east of the airport terminal.

The airport has regularly scheduled commercial jet service and supports many air taxi operators serving the surrounding communities. In 1998, the airport had 16,331 operations of wheeled aircraft.[26] The airport also accommodates floatplanes, as described in Section 3.7.1.2 (Floatplane Facilities and Operations).

Airport facilities for wheeled aircraft are comprised of one paved and lighted 7,500-foot runway (Runway 11/29), two paved taxiways (A and B), and two aprons (one at the terminal area for commercial aircraft and another apron for general aviation aircraft). Taxiway A connects the terminal apron and Runway 11/29; Taxiway B connects the general aviation apron and the terminal apron. A third taxiway, to do away with the need to back-taxi on the main runway, is under construction (2003). The airport is constrained by mountains to the southwest and Tongass Narrows to the northeast. The northwest-southeast orientation of the runway is the only practical alignment, given the physical setting. There is no control tower; the Ketchikan Flight Service Station (FSS) staff monitors flight operations.

Airport support facilities include the airport terminal, an adjacent parking lot, and circulation roads. The airport parking lot, located adjacent to the terminal, has 62 spaces, and is often filled to capacity. There are also 17 rental car spaces and 18 vehicle parking spaces at the transient floatplane dock, as well as 163 parking spaces at the airport ferry terminal on Revillagigedo Island. The pedestrian access between the ferry landing and the terminal is partially enclosed.

**Airspace and Air Traffic Management**

Federal Aviation Regulations (FAR) Part 93 Subpart M (Ketchikan International Airport Traffic Rule) prescribe specific protocols for operations at the airport and within Ketchikan airspace.[27] The FAR dictates specific communication and operational procedures in and around the airport, including communications requirements for all aircraft taking off, landing, and taxiing at the airport. An approaching aircraft must maintain a minimum altitude of 900 feet above mean sea level until it is within 3 miles of the airport, and a departing aircraft must maintain the runway heading until reaching an altitude of 900 feet above mean sea level.

[26] *DOT&PF,* Gravina Access Project, Tongass Narrows Aviation Conditions Summary*, prepared by HDR, October 1999.*

[27] *14 U.S. Code of Federal Regulations (CFR) 93.151-155 Subpart M - Ketchikan International Airport Traffic Rule*

FAR Part 77 (Objects Affecting Navigable Airspace) controls the height of every object in the vicinity of the airport that could reduce the safety and efficiency of airport operations and the surrounding airspace. The Part 77 airspace plan for Ketchikan International Airport (Figure 3.10) describes the surfaces that delineate the protected airspace and identifies the area where penetrations of this airspace occur. Most of the penetrating objects are natural features, such as trees and topographic high points. The Part 77 airspace surfaces at Ketchikan International Airport are described as follows:

**Primary Surface.** The primary surface is the surface longitudinally centered on the runway. The primary surface for Runway 11/29 extends 200 feet beyond each runway end and is 1,000 feet wide. According to the airport's most recent FAR Part 77 Airspace Drawing, completed in 1997, there are several obstructions, mostly trees and ground, located in the primary surface.

**Transitional Surface.** The transitional surface extends outward and upward at right angles to the runway centerline at a slope of 7 feet horizontally for each foot vertically (7:1) from the sides of the primary and approach surfaces. The transitional surfaces extend to where they intercept the horizontal surfaces at a height of 150 feet above the runway elevation. According to the 1997 FAR Part 77 Airspace Drawing, there are several obstructions, mostly trees and ground, located in the airport's transitional surface.

**Horizontal Surface.** The horizontal surface is a horizontal plane located 150 feet above the established airport elevation, covering an area from the transitional surface to the conical surface. The perimeter of the horizontal surface is constructed by swinging arcs from the center of each end of the primary surface and connecting the adjacent arcs by lines tangent to those arcs. The radius of the arcs is 10,000 feet for all runway ends designated for approaches that serve larger than utility-type aircraft. According to the airport's 1997 FAR Part 77 Airspace Drawing, there are several obstructions, mostly trees and ground, located in the airport's horizontal surface.

**Conical Surface.** The conical surface extends outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet. According to the airport's 1997 FAR Part 77 Airspace Drawing, there are several obstructions, mostly trees and ground, located in the conical surface.

**Approach Surface.** The approach surface is longitudinally centered on the extended runway centerline and extends outward and upward from each end of the primary surface. The inner edge of the approach surface for Runway 29 is the same width as the primary surface (1,000 feet) and it expands uniformly in width for 3,500 feet to an outer width of 4,000 feet with an approach slope of 34:1. The approach surface for Runway 11 extends for a horizontal distance of 10,000 feet at 50:1 and then an additional 40,000 feet at 40:1, to an outer width of 16,000 feet. In order to allow for the heights of vehicles on roadways, the approach surface must clear interstate highways by 17 feet, and all other roads by 15 feet.

### Airport Master Plan

The DOT&PF has recently revised the *Ketchikan International Airport Master Plan*.[28] The master plan update addresses development needs to accommodate future growth and changes in airport operations over a 20-year planning horizon. The planned upgrades most pertinent to the master plan are expansion of the terminal, aprons, taxiways, and parking capacity, as well as changes in traffic circulation on the airport roadway system. Two major projects are to build a taxiway parallel to and along the north side of Runway 11/29 (currently [2003] under construction) and to expand the runway safety area (the safety buffer around the runway that is generally free of structures) by shifting the runway 800 feet to the south. This shift would provide an additional 1,000 feet of safety area at the northwest end (without requiring substantial in-water fill), as well as 1,000 feet of safety area beyond the shifted runway at the south end.

#### 3.7.1.2 Floatplane Facilities and Operations

The project area has very high levels of floatplane activity, especially in the summer. On an average summer day, traffic in Tongass Narrows consists of more than 500 floatplane landings and takeoffs.[29] These levels of boat and plane traffic, coupled with topographic and climatic constraints, create a challenging aviation environment.

Table 3-6 summarizes the approximate number of annual aviation operations of the major floatplane facilities in the project area.

**TABLE 3-6**
**FLOATPLANE FACILITIES AND OPERATIONS**

| *Facility* | *Annual Operations* |
|---|---|
| Ketchikan Harbor Floatplane Base | 88,000 – 100,000 |
| Ketchikan International Airport | 7,000 |
| Murphy's Pullout Floatplane Base | 100 – 200 |

### Ketchikan Harbor Floatplane Base

The Ketchikan Harbor Floatplane Base is located southeast of the airport, on the northeast side of Tongass Narrows and adjacent to downtown Ketchikan (Figure 3.10). This base is open to public floatplane use. Although it has no mooring facilities for floatplane storage, the base is located near numerous privately owned air taxi floatplane docks with mooring facilities. The base features a 10,000-foot by 1,500-foot water runway that is oriented northwest-to-southeast and is generally referred to as the "NW-SE Waterway." A 3,500-foot by 1,200-foot waterway oriented roughly west-northwest to east-southeast is also located adjacent to this floatplane base (see Figure 3.10). Approximately 85 percent of the annual operations are by air taxis.[30]

[28] *DOT&PF.* Ketchikan International Airport Master Plan Draft Final Report. *November 2002.*

[29] *U.S. Coast Guard,* Tongass Narrows Voluntary Waterway Guide*, 1999.*

[30] *DOT&PF,* Gravina Access Project, Tongass Narrows Aviation Conditions Summary*, prepared by HDR, October 1999.*

### Ketchikan International Airport Floatplane Facilities

The airport accommodates floatplanes at two floating docks and a concrete ramp east of the runway and north of the airport terminal (see Figure 3.11). One dock accommodates up to 12 Twin Otter aircraft and is used for loading and unloading passengers and freight; the other dock accommodates up to three transient floatplanes. The nearby concrete ramp is used for removing floatplanes from the water for maintenance and on-shore storage. A 9,500-foot by 1,500-foot water runway extends to the northwest from the airport, and is generally referred to as the "NWW-SEE Waterway" (see Figure 3.10).

### Murphy's Pullout Floatplane Base

Murphy's Pullout Floatplane Base is located on Revillagigedo Island near Ward Cove, five miles northwest of Ketchikan. This base provides eight slips for transient floatplanes. Compared to the other floatplane facilities, this base has few operations.[31] Adjacent to Murphy's Pullout Floatplane Base is the 9,000-foot by 2,000-foot "NE-SW Waterway" that extends across Tongass Narrows and into Ward Cove (see Figure 3.10).

### Private Floatplane Facilities

Numerous private charter floatplane businesses lie along the northern shore of Tongass Narrows in Ketchikan. Some of these operators have built large docks to accommodate floatplanes. Most operators using these facilities conduct floatplane operations out of Ketchikan Harbor Floatplane Base.

## 3.7.1.3 Helicopter Operations and Facilities

Several helicopter operators serve the project area, most of which are based north of Ketchikan. Generally, helicopters operate over land and avoid the congested airspace over Tongass Narrows.[32] Helicopter operations are at their highest levels during the summer, with approximately 50 operations per day from the Temsco Helicopters and Alpine Helicopters facilities near Ward Cove.[33]

The USCG plans to construct a helicopter pad on Revillagigedo Island at Wolff Point (i.e., just north of the airport ferry terminal) to improve emergency medevac access to Ketchikan General Hospital. Currently, the USCG helicopters land at the airport and patients rely on the airport ferry to cross Tongass Narrows. Approximately 27 such operations occur each year.[34] The USCG will construct the helicopter pad on property leased from the DOT&PF. Construction is scheduled to begin in 2004, and the pad is expected to become operational by the middle of the summer 2004.[35]

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[31] *Ibid.*

[32] *Joe Hicks, Temsco Helicopters, personal communication with HDR and DOT&PF staff, May 23, 2001.*

[33] *DOT&PF,* Gravina Access Project, Tongass Narrows Aviation Conditions Summary, *prepared by HDR, October 1999.*

[34] *Keith Oney, USCG, e-mail communication with Carol Snead, HDR, April 23, 2003.*

[35] *Frank Mielke, DOT&PF, facsimile communication with Kristen Maines, HDR, April 10, 2003.*

### 3.7.1.4 Ketchikan Airspace and Operating Regulations

The Federal Aviation Administration (FAA) at the Anchorage Air Route Traffic Control Center (Anchorage Center) is the regional air traffic control center that separates and controls air traffic within its area of responsibility, including Ketchikan. The Ketchikan FSS provides aircraft pilots operating within Ketchikan airspace with air traffic and weather advisories, and information on water vessel activities to facilitate takeoffs and landings.

#### Class E Airspace

Controlled airspace is that airspace within which all aircraft operators are subject to certain requirements regarding pilot qualifications, operating rules, and equipment specifications, as prescribed by Title 14 of the Code of Federal Regulations (CFR) Part 91. All aircraft departing from or arriving at Ketchikan International Airport and the Ketchikan area floatplane facilities, as well as all aircraft passing through Tongass Narrows airspace, are subject to the Class E airspace requirements of CFR Part 91. The Class E requirements permit operating under both visual flight rules (VFR) and instrument flight rules (IFR). The Ketchikan Class E airspace ceiling is at 18,000 feet above mean sea level. The Ketchikan Class E airspace floor is divided into two subclasses: Class E (700), with an airspace floor at 700 feet above mean sea level, and Class E (surface), with an airspace floor at the ground surface.

#### Visual Flight Rules for Ketchikan

Aircraft pilots flying under VFR must adhere to the special air traffic rules and communications requirements prescribed by FAR Part 93, Subpart M, Sections 93.153 and 93.155 when they are flying in the following areas:

- To, from, or in the vicinity of Ketchikan International Airport or Ketchikan Harbor
- Within the Ketchikan Class E airspace below 3,000 feet mean sea level and within the lateral boundary of the surface area of the Ketchikan Class E airspace

VFR operators in the project area are classified as 14 CFR Part 91 and Part 135 operators. Part 91 operators are general aviation operators, and Part 135 operators are commercial air taxi and commuter operators. The basic VFR minimums for the Class E (700) airspace are:

- Flight visibility of 3 statute miles
- 500 feet below, 1,000 feet above, and 2,000 feet horizontally from clouds
- 700 feet above mean sea level (except during takeoffs and landings)

While operating within the Class E (surface) airspace, Part 91 operators must maintain an altitude sufficient to allow a safe landing if the aircraft power unit fails (Section 119(a)); they must also maintain a distance of 500 feet from any person, vessel, vehicle, or inhabited structure (Section 119(c)). Part 135 operators must maintain a minimum altitude of 500 feet above mean sea level during the day, except when taking off and landing.

Part 91 and Part 135 pilots operating in the Class E (surface) airspace below the minimum altitude for the Class E (700) airspace are considered to be operating in uncontrolled airspace.

### Special Visual Flight Rules (SVFR)

Until VFR visibility and ceiling minimums drop below the basic VFR minimums, pilots may perform VFR operations in accordance with the operating requirements of Class E (surface) airspace, described above. However, when visibility and ceiling conditions drop below VFR minimums, Part 91 and Part 135 pilots are required to receive a Special Visual Flight Rules (SVFR) clearance from the Ketchikan FSS prior to entering Class E airspace. The purpose of these SVFR procedures is to ensure that pilots receive appropriate traffic advisories, to control the number of aircraft in the airspace when flying conditions are particularly challenging, and to separate aircraft operating under IFR from VFR aircraft. The Ketchikan FSS manager estimates that five to six SVFR aircraft can operate within the Class E (surface) airspace under SVFR conditions while maintaining visual contact; total SVFR operations for 2001 were estimated to be 1,984 operations, or approximately 1.8 percent of 105,192 total annual floatplane operations[36].

Some Part 135 operators are exempt from the requirement to maintain a 500-foot minimum altitude while operating within Class E (surface) airspace. This FAA Exemption 4760 permits certain Part 135 pilots to operate floatplanes under an SVFR clearance from the Ketchikan FSS within Class E airspace below the 500-foot minimum altitude. The FAA applies additional conditions and limitations to this exemption, including:

- Operations are limited to floatplanes and amphibious aircraft being operated over water within an approved floatplane/amphibian SVFR corridor encompassing the Tongass Narrows and Ketchikan Harbor, and underlying the Ketchikan Class E airspace.
- Operations are authorized only during daylight hours or during the hours of Alaskan Civil Twilight when the sun is not more than 6 degrees below the horizon.
- Cloud cover must be greater than 50 percent and must preclude VFR flight at or above 500 feet above the surface before operations are authorized under the exemption.
- Aircraft may be operated below 500 feet above the surface down to an altitude of 400 feet above the surface only when the flight visibility is at least 2 miles, the surface wind velocity along the approved route is 12 knots or less, and the height of the sea is 1 foot or less.
- Aircraft may be operated below 400 feet above the surface down to an altitude of 200 feet above the surface only when the flight visibility is at least 3 miles, the surface wind velocity along the approved route is 12 knots or less, and the height of the sea is 1 foot or less.
- Operations are authorized only over open waterways, and operators must observe the minimum safe altitudes for emergency landings and separation clearance set forth in Title 14, CFR Part 91.119.
- Operations are authorized only when wind and sea conditions allow for the safe accomplishment of an unscheduled landing.

[36] *DOT&PF,* Gravina Access Project Special Visual Flight Rules Analysis, *prepared by HDR, December 2001.*

- Aircraft position and anti-collision lights must be on and functioning when operations are conducted under this exemption.
- No aircraft may be operated under this exemption at an altitude of less than 200 feet above the surface.

Additionally, by performing operations under Exemption 4760, certificate holders have entered into agreement with the manager of the Ketchikan FSS and the manager of the Anchorage Center to allow simultaneous IFR and SVFR operations in the Ketchikan airspace, subject to specific conditions and limitations.

### *3.7.2 Marine Navigation*

Figure 3.12 (Marine and Land Transportation Facilities) shows the locations of the marine facilities discussed in this Section 3.7.2.

Tongass Narrows is a continuation of Revillagigedo Channel that extends northwest to the Guard Islands in Clarence Strait. Tongass Narrows is divided at its lower end by Pennock Island. The channel northeast of the island is called East Channel, and the channel southwest of the island West Channel. According to the *United States Coast Pilot*,[37] both channels accommodate vessels of any draft. Marine vessels typically using Tongass Narrows include cruise ships, ferries, barges, USCG vessels, commercial and charter fishing boats, and small craft. In addition, the Tongass Narrows waterway is used by the numerous floatplanes that operate in the Ketchikan area.

Cruise ships bound for Ketchikan generally use East Channel, because it aligns better with the cruise ship docks. Barges and vessels of the Alaska Marine Highway System tend to use West Channel to avoid cruise ship traffic and because there is less shoreline development along West Channel to be affected by wake.

The following speed restriction for marine navigation in Tongass Narrows is prescribed in 33 CFR §162.240:

> *No vessel, except for public law enforcement and emergency response vessels, floatplanes during landings and take-offs, and vessels of 23 feet registered length or less, shall exceed a speed of 7 knots in the region of Tongass Narrows bounded to the north by Tongass Narrows Buoy 9 and to the south by Tongass Narrows East Channel Regulatory marker at position 55 deg. 19' 22.0" N, 131 deg. 36' 40.5" W and Tongass Narrows West Channel Regulatory marker at position 55 deg. 19' 28.5" N, 131 deg. 39' 09.7" W, respectively.*

Tongass Narrows experiences high levels of marine navigation activities within a relatively small area. According to the *Tongass Narrows Voluntary Waterway Guide*, "a typical summer day in Tongass Narrows may result in 500+ floatplane landings and takeoffs; 173 charter boat transits; 22 small passenger vessels; 4 to 6 large cruise ships with 1 to 2 at anchor; 150 fishing vessels; 3 to 5 barge/tug transits; 30 to 40 kayaks; and an unknown number of recreational and transient

[37] *United State Coast Pilot 8, Pacific Coast Alaska: Dixon Entrance to Cape Spencer, 23rd Edition, 1999.*

boat traffic."[38] Due to Tongass Narrows' high volume of marine traffic, constrained geography, and multiple directions of travel, the *Tongass Narrows Voluntary Waterway Guide* was developed to provide guidelines for the safe operation of various craft in the area. Figure 3.13 illustrates the areas designated in the guide for use for cruise ship anchorage and lighterage, fishing vessel anchorage, kayaks, float planes, and sailboat races.

To illustrate the general levels of activity in Tongass Narrows, Table 3-7 presents the total numbers of annual commercial marine trips within Tongass Narrows for 1991 through 2000, by vessel type, as reported by the U.S. Army Corps of Engineers (COE), Waterborne Commerce Statistics Center. The maximum draft for each type of vessel is presented as well.

**TABLE 3-7**
**TONGASS NARROWS**
**TOTAL TRIPS AND MAXIMUM DRAFTS, BY VESSEL TYPE, BY YEAR**

| Year | Self-Propelled Passenger & Dry Cargo | | Self-Propelled Tanker | | Self-Propelled Tow or Tug | | Non-Self-Propelled Dry Cargo[1] | | Non-Self-Propelled Tanker[1] | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Trips | Max Draft | Trips | Max Draft | Trips | Max Draft | Trips | Max Draft | Trips | Max Draft | Trips | Max Draft |
| 1991 | 2511 | 20 | 18 | 34 | 2480 | 17 | 1372 | 15 | 172 | 14 | 6553 | 34 |
| 1992 | 2755 | 20 | 18 | 35 | 2129 | 18 | 1842 | 13 | 143 | 13 | 6887 | 35 |
| 1993 | 2818 | 20 | 16 | 28 | 2506 | 20 | 2243 | 16 | 43 | 13 | 7626 | 28 |
| 1994 | 4495 | 15 | 27 | 34 | 2831 | 18 | 2743 | 15 | 245 | 16 | 10341 | 34 |
| 1995 | 4288 | 32 | 24 | 35 | 3102 | 22 | 2692 | 25 | 295 | 17 | 10401 | 35 |
| 1996 | 4369 | 37 | 24 | 28 | 2903 | 16 | 2369 | 18 | 431 | 20 | 10096 | 37 |
| 1997 | 4591 | 36 | 5 | 22 | 2845 | 20 | 2074 | 25 | 471 | 16 | 9986 | 36 |
| 1998 | 4811 | 29 | 0 | 0 | 2066 | 18 | 2012 | 29 | 339 | 16 | 9228 | 29 |
| 1999 | 7940 | 29 | 0 | 0 | 2855 | 22 | 2660 | 29 | 534 | 15 | 13989 | 29 |
| 2000 | 6796 | 31 | 0 | 0 | 3267 | 21 | 2759 | 23 | 336 | 18 | 13158 | 31 |
| Maximum | 7940 | 37 | 27 | 35 | 3267 | 22 | 2759 | 29 | 534 | 20 | 13989 | 37 |
| Average | 4537 | 26.9 | 13 | 21.6 | 2698 | 19.2 | 2277 | 20.8 | 301 | 15.8 | 9827 | 32.8 |

[1] *These categories refer to barges*

*Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center*

The following subsections describe the existing marine navigation conditions in Tongass Narrows in the vicinity of the Gravina Access Project area. The *Gravina Access Project Marine Navigation Conditions Summary Technical Memorandum* (DOT&PF October 1999) presents a detailed accounting of the existing marine navigation conditions in the study area.

### 3.7.2.1 Cruise Ships

The largest vessels that routinely use Tongass Narrows are cruise ships that call seasonally at Ketchikan, primarily during the summer (May through September). Each summer, cruise ships

[38] *USCG,* Tongass Narrows Voluntary Waterway Guide*, 1999.*

make hundreds of port calls in Ketchikan. With some annual variations, cruise ship calls in Ketchikan increased through the 1990s; 39 individual cruise ships made 514 port calls in Ketchikan in 2001 (Table 3-8)[39]. Cruise ships bound for Ketchikan or transiting through the area typically use the East Channel. The cruise ship docks are located on Revillagigedo Island, at the north end of East Channel. Figure 3.12 illustrates the location of the cruise ship dock and the marine routes used by cruise ships; Figure 3.13 illustrates the location of the cruise ship anchorage and tender operation areas in Tongass Narrows. At any given time during the summer, as many as five large cruise ships may be moored and/or at anchor in the Ketchikan Harbor area.

During the summer cruise season, most of the large cruise ships operating in Alaska are home-ported in Vancouver, British Columbia; several are home-ported in Seattle. As a result, nearly all of them pass under Lion's Gate Bridge in Vancouver Harbor and/or the Seymour Narrows cable crossing (north of Vancouver between Vancouver Island and the mainland). Vertical clearances of these structures are 200 feet and 180 feet, respectively. The Lion's Gate 200-foot clearance has effectively limited the height of the cruise ships that serve Ketchikan.

Table 3-9 presents the characteristics of the large cruise ships that typically call at Ketchikan. The largest cruise ships that currently call at Ketchikan are 948 feet long, have drafts of up to 26.2 feet, and can accommodate more than 2,500 passengers (i.e., the Star Princess).[40]

Several of the cruise lines that currently serve Southeast Alaska have larger ships on order, but the very large, newer cruise ships are generally regarded as not well suited to cruising in Southeast Alaska, but are better suited to other geographic markets (such as the Mediterranean) that are experiencing rapid growth and are not as physically restricted as Southeast Alaska waterways.

[39] *Ketchikan Visitors Bureau, <www.visit-ketchikan.com/cruise_ship_info/shipinfo.html>. 2001.*

[40] *DOT&PF,* Gravina Access Project Technical Memorandum Marine Navigation Conditions Summary*, October 1999.*

**TABLE 3-8**
**CRUISE SHIP ARRIVAL DATA FOR KETCHIKAN 1990 -2001**

| *Year* | *Calls* | *Ships* | *Passengers* |
|---|---|---|---|
| 2001 | 514 | 39 | 665,221 |
| 2000 | 461 | 34 | 549,114 |
| 1999 | 452 | 32 | 565,005 |
| 1998 | 488 | 35 | 531,108 |
| 1997 | 472 | 35 | 480,688 |
| 1996 | 437 | 36 | 426,232 |
| 1995 | 329 | 32 | 355,784 |
| 1994 | 453 | 30 | 379,645 |
| 1993 | 421 | 28 | 321,780 |
| 1992 | 364 | 23 | 263,046 |
| 1991 | 362 | 27 | 242,755 |
| 1990 | 314 | 23 | 236,325 |

*Source: Ketchikan Visitors Bureau, 2002.*

**TABLE 3-9**
**LARGE CRUISE SHIPS OPERATING IN SOUTHEAST ALASKA DURING 2002 CRUISE SEASON**

| *Operator* | *Ship* | *Passenger Capacity*** | *Gross Tonnage* | *LOA* (feet)* | *Register Length (feet)* | *Beam Max (feet)* | *Beam Register (feet)* | *Maximum Draft (feet)* | *Air Draft (feet)* |
|---|---|---|---|---|---|---|---|---|---|
| Carnival | *Carnival Spirit* | 2,142 | 85,920 | 959.6 | 854.9 | 105.6 | | 25.6 | 173.8 |
| Celebrity | *Infinity* | 2,038 | 90,228 | 964.5 | 862.6 | 105.6 | | 26.9 | 180.4 |
| | *Mercury* | 2,114 | 77,713 | 865.8 | 740.0 | 105.6 | | 25.3 | |
| | *Summit* | 2,038 | 90,228 | 964.5 | 862.6 | 105.6 | | 26.9 | 180.4 |
| Crystal Cruises | *Crystal Harmony* | 940 | 48,621 | 790.6 | 672.5 | 105.0 | 97.1 | 24.6 | 143.0 |
| Holland America | *Amsterdam* | 1,460 | 60,874 | 780.0 | 674.2 | 111.5 | 105.6 | 25.6 | 178.8 |
| | *Ryndam* | 1,266 | 55,451 | 720.0 | 607.0 | 111.6 | 101.1 | 24.6 | 162.3 |
| | *Statendam* | 1,266 | 55,451 | 720.0 | 607.0 | 111.6 | 101.1 | 24.6 | 162.3 |
| | *Veendam* | 1,266 | 55,451 | 720.0 | 607.0 | 111.6 | 101.1 | 24.6 | 162.3 |
| | *Volendam* | 1,440 | 60,906 | 781.0 | | 105.9 | | 25.6 | |
| | *Zaandam* | 1,440 | 60,906 | 781.0 | | 105.6 | | 25.6 | |
| Norwegian Cruise Line | *Norwegian Sky* | 2,002 | 78,200 | 848.6 | | 116.3 | 105.8 | 26.2 | |
| | *Norwegian Wind* | 1,748 | 50,764 | 754.0 | 655.8 | | 93.5 | 23.0 | 172.4 |
| Princess | *Dawn Princess* | 2,022 | 77,441 | 856.3 | 762.0 | 110.2 | 105.8 | 26.1 | 162.0 |
| | *Ocean Princess* | 2,022 | 77,499 | 856.3 | 762.0 | 110.2 | 105.9 | 26.2 | 162.0 |
| | *Regal Princess* | 1,590 | 70,285 | 804.0 | 670.6 | 105.9 | | 25.9 | 151.0 |
| | *Sea Princess* | 2,022 | 77,441 | 856.3 | 762.0 | 110.2 | 105.8 | 26.2 | 162.0 |
| | *Star Princess* | 2,592 | 108,806 | 948.0 | 814.9 | 131.9 | 118.1 | 26.2 | 199.4 |
| | *Sun Princess* | 2,022 | 77,441 | 856.3 | 762.0 | 110.2 | 105.8 | 26.2 | 162.0 |
| Radisson Seven Seas | *Seven Seas Navigator* | 504 | 28,550 | 560.0 | 492.1 | 81.4 | | 22.3 | 119.4 |
| Royal Caribbean Inc. | *Legend of the Seas* | 1,804 | 70,950 | 867.0 | 726.6 | 105.0 | | 23.9 | |
| | *Radiance of the Seas* | 2,100 | 90,090 | 961.0 | 864.5 | 131.2 | 105.6 | 26.7 | 173.2 |
| | *Vision of the Seas* | 1,998 | 78,491 | 915.3 | 770.0 | | 105.6 | 25.6 | 171.0 |
| World Explorer Cruises | *Universe Explorer* | 737 | 23,500 | 617.0 | 570.0 | 88.0 | 84.0 | 27.3 | 130.0 |

* *LOA = length overall* ** *Passenger capacity lower berth*

In addition to the large cruise ships operating in Southeast Alaska and calling at Ketchikan, there are a growing number of small cruise ships offering adventure and/or natural history oriented cruising opportunities. Table 3-10 provides a representative sample of these vessels.

**TABLE 3-10**
**SMALL CRUISE VESSELS**
**OPERATING IN SOUTHEAST ALASKA**

| *Operator* | *Vessel* | *Passengers* | *LOA* (feet)* | *Beam (feet)* | *Draft (feet)* | *Tonnage* |
|---|---|---|---|---|---|---|
| Glacier Bay Tours | Executive Explorer | 49 | 98.5 | 36.75 | | |
| | Wilderness Discoverer | 88 | 169 | 38 | | 95 |
| Clipper Cruise Lines | Yorktown Clipper | 138 | 257 | 43 | 8 | 99.5 |
| Lindblad Special Expeditions | Sea Bird | 70 | 152 | 31 | 8 | 99.7 |
| | Sea Lion | 70 | 152 | 31 | 8 | 99.7 |
| Cruise West | Spirit of Discovery | 84 | 166 | | | 94 |
| | Sheltered Seas | 90 | 90 | | | 95 |
| | Spirit of Glacier Bay | 58 | 125 | | | 97 |
| | Spirit of Alaska | 82 | 143 | | | 97 |
| | Spirit of Columbia | 78 | 143 | | | 98 |
| | Spirit of '98 | 101 | 192 | | | 96 |
| | Spirit of Endeavor | 102 | 219 | | | 99 |

* *LOA = length overall*

### 3.7.2.2 Alaska Marine Highway System and Inter-Island Ferry Authority Ferries

#### Alaska Marine Highway System Operations

The AMHS operates five mainline and two feeder ferries for vehicles and passengers in Southeast Alaska, including Ketchikan. The AMHS dock is located immediately south of the ASD facility (Figure 3.12).

AMHS port calls at Ketchikan have varied for the period of 1991 through 2001, ranging from a high of 1,075 (in 1994 and 1995) to a low of 837 in 2001 and averaging approximately 990 port calls per year[41]. In recent years, AMHS calls at Ketchikan have declined from 1,007 in 1999 to 837 in 2001[42]. This decrease in AMHS traffic is due in part to the addition of IFA service (see below) between Hollis and Ketchikan in 2001 that was previously provided by AMHS. July is the peak traffic month in the annual cycle for AMHS.

AMHS vessels usually use the West Channel to avoid the cruise ship traffic and because there is less shoreline development and hence less need to control wakes.

[41] 1998 Traffic Volume Report. *Alaska Marine Highway System, <www.dot.state.ak.us/amhs/info/general/stats/98tvr/atvr-1998.pdf>.*

[42] *DOT&PF,* Annual Traffic Volume Report, 2001 January 1 ~December 31, *Alaska Marine Highway System. Compiled July 2002*

### Inter-Island Ferry Authority

The IFA provides regular service using a new ferry, the *Prince of Wales,* commissioned in 1999, from Prince of Wales communities to Ketchikan. Currently the IFA provides two daily round trips between Ketchikan and Hollis during summer months (June through August), and one daily round trip from September through May. The IFA ferry terminal is located adjacent to the AMHS terminal (see Figure 3.12), across Tongass Narrows from Ketchikan International Airport.

### Southeast Alaska Transportation Plan

The DOT&PF *Southeast Alaska Transportation Plan* (SATP), issued in March 1999, calls for major changes in the way that public ferry services are delivered in Southeast Alaska. The SATP planning horizon is the period between the year 2000 and 2020. When fully implemented, the SATP may result in reduced port calls throughout Southeast Alaska by existing large "mainline" vessels. However, the AMHS Vessel Suitability Study mandated by the SATP calls for the introduction of shuttle ferries operating as point-to-point dayboats on several routes based from Ketchikan. The shuttle ferry operating north from Ketchikan is likely to be identical or similar to the ferries currently under construction for AMHS at the Derecktor Shipyard. The point-to-point dayboat operating south of Ketchikan to Prince Rupert under the SATP is likely to be either a slightly larger fast vehicle ferry or a new conventional monohull. With the introduction of these new dayboat services, and even with the possibility of modest reductions in existing AMHS "mainline" service, the number of AMHS port calls at Ketchikan are unlikely to decrease and may even increase under the SATP.

### 3.7.2.3 Tugs and Barges

Tug and barge transportation is the principal mode of delivery for both dry and liquid cargoes throughout Southeast Alaska. The waterborne commerce statistics indicate an average of 2,277 trips per year by dry cargo barges in Tongass Narrows (including Ketchikan) for years 1991 through 2000, as shown in Table 3-7. Three major common carriers providing containerized barge service make a total of four scheduled calls per week to Ketchikan year-round, for a total of about 408 calls (corresponding to 816 transits) on an annual basis. Petroleum products are also delivered almost exclusively by barge. There was an average of 301 petroleum barge trips in Tongass Narrows (including Ketchikan) for 1991 through 2000.

Barges represent a substantial contribution to total the overall Tongass Narrows marine traffic volume. However barges are not necessarily transiting Tongass Narrows during peak traffic periods. Barge operators interviewed for the *Gravina Access Project Marine Navigation Conditions Summary Technical Memorandum*[43] expressed a preference for transiting Tongass Narrows in the winter months, even if they have no port call in Ketchikan, as Tongass Narrows' conditions are preferable to other routes. In the summer months, the barge operators not calling at Ketchikan could use alternative routes to avoid the congestion in Tongass Narrows.

### 3.7.2.4 Airport Ferry Service

The airport ferry service is the primary mode of access for vehicles, bicyclists, and pedestrians to the airport on Gravina Island. The operating schedule is 7 days a week, 16 hours a day. In the winter, the two ferries operate every 30 minutes; in the summer (May through mid-August),

[43] *DOT&PF, 1999.*

the ferries operate every 15 minutes from approximately 10 a.m. to 5 p.m. on weekdays, and every 30 minutes at other times. When air carrier planes are active, usually during the summer, the ferry can exceed capacity.[44] The ferry terminal on Revillagigedo Island is located about 2.5 miles northwest of downtown Ketchikan, directly opposite the airport terminal on Gravina Island (see Figure 3.12).

#### 3.7.2.5 USCG Facilities and Operations

The USCG operates three cutters from its station located between Ketchikan and Saxman (see Figure 3.12). These cutters range in length from 110 to 213 feet, with beams of between 22 and 41 feet, drafts of between 7.3 and 13.9 feet, and air drafts of 60 to 100 feet.[45]

USCG buoy tenders will also occasionally call at Ketchikan. The buoy tenders have a length of 225 feet, a beam of 43 feet, a draft of 13.5 feet, and an air draft of 90 feet. The largest vessels operated by the USCG are their 378-foot Hamilton Class cutters and their ice breakers, Polar Sea, Polar Star, and Healy. However, these USCG vessels rarely call at Ketchikan.

According to the USCG, there are no regular U.S. Navy operations in Tongass Narrows. However, the USCG Station is an emergency port for naval submarines using the Back Island acoustic range located in Behm Canal. U.S. Navy sub-surface ballistic missile submarines have a surface mode operating draft of 36.5 feet, making them the deepest draft vessel likely to call at Ketchikan, and a reported air draft of 91 feet.

#### 3.7.2.6 National Oceanic and Atmospheric Administration Vessels

Survey vessels of the National Oceanic and Atmospheric Administration (NOAA) transit Tongass Narrows several times each year. NOAA plans to homeport its survey vessel Fairweather in Ketchikan beginning in 2003, mooring it just south of the pier at the USCG Station. The Fairweather has a 100-foot air draft.[46]

#### 3.7.2.7 Commercial Fishing and Charter Vessels and Small Craft

Commercial and charter fishing vessels and recreational craft, such as powerboats and sailboats, operate in Tongass Narrows. Figure 3.13 shows the fishing vessel anchorage areas designated in the *Tongass Narrows Voluntary Waterway Guide*.[47] The Ketchikan area has seven small boat harbors. Their capacities are shown in Table 3-11.

[44] *DOT&PF.* Ketchikan International Airport Master Plan Draft Final Report. *November 2002.*

[45] *Mark Dalton, HDR, telephone call to Lt. Martin, U.S. Coast Guard, September 15, 1999.*

[46] *Lt. Cmdr. Doug Baird, National Oceanic and Atmospheric Administration, email to Mark Dalton, HDR. February 6, 2002.*

[47] *USCG, 1999.*

**TABLE 3-11**
**KETCHIKAN HARBOR CAPACITIES**

| *Harbor* | *Capacity by Boat Length* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | *<21'* | *21'-30'* | *31'-40'* | *41'-50'* | *51'-70'* | *71'-100'* | *>100'* | *Total* |
| Bar Harbor North | 53 | 109 | 61 | 34 | 7 | 2 | 0 | 266 |
| Bar Harbor South | 110 | 165 | 92 | 30 | 31 | 3 | 0 | 431 |
| City Float | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| Thomas Basin | 50 | 30 | 55 | 27 | 20 | 0 | 0 | 182 |
| Ryus Dock | Transient and Lighterage Moorage Only | | | | | | | |
| Hole-in-the-Wall | 17 | 9 | 2 | 0 | 0 | 0 | 0 | 28 |
| Knudsen Cove | 29 | 20 | 0 | 0 | 0 | 0 | 0 | 49 |
| **TOTAL** | 273 | 333 | 210 | 91 | 58 | 5 | 0 | 970 |

*Source: DOT&PF, Ports & Harbors, Alaska Harbor Management System, Operations Management Report, 1994*

Table 3-12 provides the 1998 levels of boat usage in the Ketchikan area, as recorded by the City of Ketchikan, Port and Harbors Department.

**TABLE 3-12**
**1998 BOAT USE IN KETCHIKAN**

| | |
|---|---|
| Transient Boats | 3,000 to 4,000 |
| Boat-Days of Transient Moorage | 6,050 |
| 1-Month Transient Moorage Permits | 158 |
| 3-Month Transient Moorage Permits | 528 |
| Charter Boats in Harbors | 62 |
| Commercial Fishing Boats in Harbors | 800 |
| Reserved Stalls Billed Out in July 1998 | 844 |

In addition to the recreational small craft, fishing charter boats, and commercial fishing boats in harbors, there are three very active boat-launching ramps in the Ketchikan area. These ramps are at Bar Harbor, Mountain Point, and Knudsen Cove. Launching permits, issued by the City of Ketchikan, Port and Harbors Department, in 2002 are given in Table 3-13.

**TABLE 3-13**
**2002 KETCHIKAN BOAT LAUNCH PERMITS**

| *Day Permits* | |
|---|---|
| Bar Harbor | 256 |
| Mountain Point | 268 |
| Knudsen Cove | 327 |
| Total Day Permits | 851 |

| *Annual and Semi-Annual Permits* | |
|---|---|
| Commercial Permit | 3 |
| Annual Permits | 401 |
| Semi-Annual Permits | 85 |
| Free Annual Permits to Reserve Moorage Clients (Estimate) | ~ 400 |
| Total Annual and Semi-Annual Permits | 889 |

On summer weekends, the boat launches are in nearly continuous use for at least 12 hours per day. Estimating that an average launch or retrieval takes approximately five minutes, the total number of launches and retrievals on a summer weekend day is approximately 432 for the three launch ramps in the Ketchikan area.

### 3.7.2.8 Kayaks

A large number of kayaks operate on the waters of Tongass Narrows. During the summer tourist season several outfitter/guide operations offer kayak excursions originating in Ketchikan. In addition, local residents also operate in Tongass Narrows as individual kayakers. Kayaks are not easily observed by sight or on radar, and are therefore at risk from other vessels. Two kayak operating zones are identified in the *Tongass Narrows Voluntary Waterway Guide*[48] – one (North kayak zone) extending from Hansen Float to the North end of Pennock Island and the second (South kayak traffic area) extending from Thomas Basin to Pennock Island immediately north of Radenbough Cove (see Figure 3.13).

### 3.7.2.9 Personal Watercraft

Personal watercrafts include vessels such as jet skis, which are small and able to achieve high speeds (on the order of 50 knots). The *Tongass Narrows Voluntary Waterway Guide* states: "Although these craft are not restricted in Tongass Narrows, due to the high volume and variety of traffic in Tongass Narrows, mariners wishing to operate personal watercraft should not operate them in Tongass Narrows."[49] Few personal watercraft operate in Tongass Narrows.

[48] *Ibid.*

[49] *Ibid.*

#### 3.7.2.10 Floatplanes

Floatplanes taxiing, landing, and taking off from Tongass Narrows are currently subject to the operational guidelines contained in the *Tongass Narrows Voluntary Waterway Guide*.[50] The guide identifies two narrow floatplane-operating zones (see Figure 3.13), one in front of the Ketchikan waterfront, and one hugging the Gravina Island shore, and extending northwest from the Ketchikan Airport terminal. A third floatplane operating area is located in the vicinity of Ward Cove. As described in the *Tongass Narrows Voluntary Waterway Guide*,[51] floatplane traffic on Tongass Narrows is seasonally quite heavy, comprising in excess of 500 takeoffs and landings on an average summer day, and as many as 100,000 annual floatplane operations occurring from the Ketchikan Harbor Seaplane Base located near downtown Ketchikan. Each floatplane operation involves taxiing, takeoff, or landing within Tongass Narrows. Floatplane aviation operations are discussed in Section 3.7.1.2.

#### 3.7.2.11 Other Issues

Wreck Buoy #6 marks the location of a 327-foot barge that sank in 1954, offshore from the Plaza Mall area. In May 2003, the U.S. Army planned to raise and re-sink the barge in deeper water; however, moving the barge proved to be problematic and the barge remains in the same location, still marked by Wreck Buoy #6.

### *3.7.3 Vehicular Travel*

#### 3.7.3.1 Revillagigedo Island

The road system on Revillagigedo Island is limited to downtown Ketchikan and the more populated surrounding areas. Tongass Avenue, the primary thoroughfare and the most traveled road, provides the primary access to most businesses, schools, shops, homes, and recreation facilities. Outside of the city, Tongass Avenue becomes Tongass Highway, extending north to North Point Higgins and south to Herring Cove, beyond Saxman. Tongass Avenue is predominantly a two-lane facility, with on-street parking that runs from the northwest to the southeast along Tongass Narrows. For some stretches of road, however, additional lanes have been added at the approaches to intersections to accommodate the increased traffic. Traffic signals are provided at the intersections with Carlanna Lake Road, Jefferson Street, Washington Street, and Dock Street. Other intersections in the study area are controlled by stop signs.

Third Avenue currently runs from Tongass Avenue to Washington Street, and is scheduled for extension to the east at the Schoenbar Road intersection. Until this upgrade is completed, Tongass Avenue is the only cross-town road in the study area.

Traffic volumes for the project area during the peak hour range from approximately 1,000 vehicles on South Tongass Avenue (e.g., south of downtown Ketchikan at the intersection with Deermount Street) to approximately 2,000 vehicles in the downtown area (i.e., at the intersection of Tongass Avenue with Jefferson Street).[52] Traffic volume to the airport, via ferry,

[50] *Ibid.*

[51] *Ibid.*

[52] *DOT&PF,* Gravina Access Project, Final Traffic Assessment Technical Memorandum*, prepared by HDR, November 2002.*

was 71,394 vehicles in 2002 (but as high as 91,884 as recently as 1999). However, many people access the airport as pedestrians, leaving their cars in Ketchikan. The total ferry passenger "traffic," including those with cars and those without, was 321,958 in 2002 (385,332 in 1999).

The project team identified twelve intersections on Tongass Avenue that would be potentially affected by the Gravina Access Project alternatives (see Figure 3.14). These intersections are:

- Deermount Street
- Bawden Street
- Main Street
- Mission Street
- Dock Street
- Schoenbar Road
- Washington Street
- Jefferson Street
- Third Avenue
- Carlanna Lake Road
- Bryant Street
- Existing Ferry Access

Existing traffic conditions at these intersections were measured with respect to Level of Service (LOS). Intersection LOS analysis was conducted using methodologies described in the 2000 *Highway Capacity Manual*.[53] The LOS describes the quality of traffic operations, ranging from A (least congested, least delay) to F (most congested, most delay). The relationship between LOS and delay is summarized in Table 3-14.

**TABLE 3-14**
**LEVEL-OF-SERVICE CRITERIA FOR INTERSECTIONS**

| ***Level of Service*** | ***Signalized Intersection Criteria*** *Average Total Delay (Seconds per Vehicle)* | ***Unsignalized Intersection Criteria*** *Average Total Delay (Seconds per Vehicle)* |
|---|---|---|
| A | < 10.0 | < 10.0 |
| B | 10.1 to 20.0 | 10.1 to 15.0 |
| C | 20.1 to 35.0 | 15.1 to 25.0 |
| D | 35.1 to 55.0 | 25.1 to 35.0 |
| E | 55.1 to 80 | 35.1 o 50.0 |
| F | > 80 | > 50 |

*Source: Transportation Research Board, Highway Capacity Manual; Washington, DC; 2000*

The range of delay is lower for unsignalized intersections than for signalized intersections because drivers expect different performance levels for each type of intersection. That is, motorists expect to stop at signalized intersections more often than at unsignalized intersections. Intersections with a LOS E or F are considered to be have traffic impacts deemed "unacceptable" from a traffic engineering perspective. Table 3-15 provides the existing LOS at the 12 project area intersections. Note that the *Highway Capacity Manual* methodology provides a composite LOS for signalized intersections and the LOS for each minor move (individual approaches) at unsignalized intersections.

[53] *Transportation Research Board,* Highway Capacity Manual*, Washington DC, 2000*

**TABLE 3-15**
**EXISTING LEVEL-OF-SERVICE AT PROJECT AREA INTERSECTIONS**

| *Intersection with Tongass Avenue (Type of Control)*<br>*Direction of Movement: NB = Northbound, SB = southbound, EB = Eastbound, WB = Westbound, L = left turn movement, R = right turn movement, LR = left and right turn movements* | *Existing Condition* | |
|---|---|---|
| | *LOS* | *Delay (seconds)* |
| Deermount (Stop) | | |
| EBL | A | 8.3 |
| SBL | C | 21.5 |
| SBR | B | 11.3 |
| Bawden (Stop) | | |
| NBL | A | 8.0 |
| SBLR | A | 8.3 |
| WBLR | C | 22.3 |
| EBL | D | 29.0 |
| EBR | B | 14.7 |
| Main (Stop) | | |
| NBL | A | 8.2 |
| SBLR | A | 8.0 |
| WBLR | B | 14.8 |
| EBLR | C | 17.5 |
| Mission (Stop) | | |
| NBL | A | 9.3 |
| Dock (Signal) | A | 4.4 |
| Schoenbar (Stop) | | |
| EBL | B | 11.4 |
| WBL | A | 9.4 |
| NBLR | F | 288.8 |
| SBL | F | 140.9 |
| SBR | D | 25.3 |
| Washington (Signal) | A | 5.3 |
| Jefferson (Signal) | B | 11.1 |
| Third (Stop) | | |
| EBL | B | 10.5 |
| SBL | F | 65.0 |
| SBR | B | 12.1 |
| Carlanna (Signal) | B | 14.6 |
| Bryant (Stop) | | |
| EBL | A | 8.8 |
| SBL | D | 33.9 |
| SBR | B | 12.8 |
| Airport Ferry Access Drive (Stop) | | |
| WBL | A | 9.2 |
| NBLR | C | 23.0 |

*Source: DOT&PF, Gravina Access Project Final Traffic Assessment Technical Memorandum, prepared by HDR Alaska, Inc. November 2002.*

At Schoenbar Road, southbound left turns from Schoenbar, and northbound traffic from Taquan Air Drive currently operate at LOS F, although each move represents fewer than 10 peak hour vehicles. At Third Avenue, southbound left turns operate at LOS F. The remaining moves on Tongass Highway operate at LOS D or better.

#### 3.7.3.2 Gravina Island

There are no public roads on Gravina Island. A private access road runs north from the airport to a timber processing plant near Lewis Reef. The Borough has acquired a provisional permit from the COE for construction of a new road around the west side of the airport to the Lewis Reef development area. At this time, funding has not been secured for construction of the road. Except for cars driven by employees of the timber processing plant on the existing private road, all vehicles ferried to the airport remain on airport property while on Gravina Island. Travel times via ferry from various locations on Revillagigedo Island to the airport on Gravina Island are shown in Table 3-16. Further discussion appears in Section 3.3.5, Accessibility.

**TABLE 3-16**
**TRAVEL DISTANCES AND ESTIMATED VEHICULAR TRAVEL TIMES***

| *Origin and Destination* | *Distance (miles)* | *Vehicular Travel Times* (minutes)* |
|---|---|---|
| From Downtown to Airport Terminal | 3.29 | 27 |
| From Ward Cove to Airport Terminal | 5.04 | 25 |
| From Carlanna Creek to Airport Terminal | 0.53 | 19 |

** The calculation of travel times is based on the length of roadway traveled and the average speed of vehicles, pedestrians, and bicycles on that roadway. The average speed of vehicles was assumed to be 5 miles per hour (mph) slower than the posted speed limit. Ferry time, based on scheduled summer ferry service every 15 minutes, was assumed to be 19 minutes, including 15 minutes for waiting/loading/unloading and 4 minutes for transit. Because of variations in ferry waiting time and traffic, actual travel times may vary.*

#### 3.7.3.3 Pennock Island

There are no roads on Pennock Island.

## 3.8 PEDESTRIANS AND BICYCLISTS

### *3.8.1 Pedestrians*

Most pedestrians in the project area frequent the downtown area. Many tourists, principally from cruise ships, walk the area. Local residents and business people also walk in the downtown area, traveling between their parked car and their destination.

### *3.8.2 Bicyclists*

The Borough and the City of Ketchikan commissioned a plan to develop bicycle trails and bike lanes. The *Comprehensive Pedestrian and Bikeways Plan*[54] characterized bicycle use in Ketchikan based on trip purpose (e.g., commuting to work or school, recreation, and shopping),

[54] *The ORB Organization and Carl Buttke, Inc.,* Comprehensive Pedestrian and Bikeway Plan, *prepared for the Ketchikan Gateway Borough and City of Ketchikan, July 1985.*

age of riders, terrain, bicycle accident, and demand for bicycle facilities. The plan recommended a bicycle and pedestrian plan involving bikeways, bike lanes, bike paths, and trails that would connect all parts of the community, from West End residential areas to Saxman. Portions of the plan have been implemented and continue to be implemented as opportunities arise, usually in conjunction with road projects. New trails are under construction north and south of downtown. During the summer, some travelers passing through Ketchikan on the ferry bring their bicycles for sightseeing and recreation.

## 3.9 GEOLOGY, TOPOGRAPHY, AND WIND

### *3.9.1 Geology and Topography*

The landforms in the project area were developed and shaped by tectonic activity, glacial ice, and erosion. Bedrock is overlain by unconsolidated deposits such as marine deposits, beach and stream deposits (including alluvial fan and fan-delta deposits), and colluvium deposits. The alluvial fan and fan-delta deposits are present at the mouths of many streams that flow into Tongass Narrows, such as at the mouths of Ketchikan, Carlanna, and Hoadley Creeks and of many streams on Gravina Island.

A network of faults dissects Southeast Alaska. Known faults near the project area are:

- Queen Charlotte-Fairweather fault, an active northwest-southeast fault about 100 to 110 miles southwest of Ketchikan
- Chatham Strait fault, a north-northwest to south-southeast fault intersecting the Queen Charlotte-Fairweather fault southwest of Ketchikan that was active 2 to 65 million years ago
- Clarence Strait fault, in Clarence Strait, just west of Gravina Island, which has about 9 miles of displacement

The area around Ketchikan on Revillagigedo Island is generally quite hilly, with steeply rising slopes starting at or near the shoreline. Pennock and Gravina Islands within the project area exhibit more rolling terrain, with some steep areas, particularly along the west side of Pennock Island.

### *3.9.2 Soils*

With little seasonal variation, the heavy precipitation and cool temperatures of the Ketchikan area make climate the most influential factor in soil formation. The region's soils are typically saturated. Because of the cool, wet climate, decomposition of organic matter is slow, and soils are highly acidic and generally low in available nutrients. Glacial till or bedrock is normally found beneath the soil, and is often responsible for the poorly drained soils on gentle slopes.

The region's soils are generally forested soils or muskegs high in organic matter. Forested soils occur in many areas, from lowlands to rocky sideslopes to steep slopes; generally, these soils are moderately well drained, but in certain areas, they are well or poorly drained. Muskegs are commonly found on level or gently sloping landforms and have poor drainage. The depth to bedrock in both forested soils and muskegs ranges from less than 1 to more than 15 feet. Gravina Island is mainly made up of muskeg and poorly drained-forested soils; the eastern

portion of Gravina Island and most of Pennock Island are primarily muskeg. Revillagigedo Island soils in the project area are poorly drained forested soils.

### *3.9.3 Wind*

Wind speed and directional data appears in *Wind Climatology Technical Memorandum March 2000*[55] (see Appendix E). The data presented in this report were based on hourly data collected at the Ketchikan International Airport between 1973 and 1998. Wind speed measurements collected between 1973 to September 1996 were based on a 1-minute average wind speed and, thereafter, were based on a 2-minute average. The ratio of the 1-minute average to the 2-minute average is 1.06, and this correction factor was applied to the data subsequent to September 1996 to provide a consistent set of data based on a 1-minute average wind speed (see Table 3-17).

**TABLE 3-17**
**KETCHIKAN AIRPORT WIND STATISTICS**

| *Ketchikan Airport Wind Statistics* | *1-minute average (mph)* | *Gust wind speed (mph)* |
|---|---|---|
| 100 year return period | 85 | 130 |
| 50 year return period | 78 | 119 |
| 10 year return period | 64 | 98 |
| 5 year return period | 58 | 87 |

Wind speeds at the airport are measured within about 30 feet of the ground surface. Speeds are higher at higher elevations. Estimates done for this project of the maximum gust over the waters of the East Channel of Tongass Narrows at about 250 feet above water level are about 145 mph.

## 3.10 AIR QUALITY

### *3.10.1 Project Area Status*

The Ketchikan area has generally good air quality, with no recorded exceedances of National Ambient Air Quality Standards (NAAQS) in the area. Based on the NAAQS, the project area is classified as an attainment area (i.e., its air quality meets the standards).

### *3.10.2 Air Pollutants*

The Alaska Department of Environmental Conservation (ADEC) has conducted ambient air quality monitoring for particulate matter during the "smoke season"—December and January—to characterize the effects of the use of wood for heating fuel on ambient air quality. These monitoring activities showed that levels of particulates did not approach or exceed the NAAQS.[56]

[55] *HDR Alaska, Inc., March 2000,* Wind Climatology Technical Memorandum*, Gravina Access Project.*

[56] *Alaska Department of Environmental Conservation, Division of Air and Water Quality,* Air Quality Monitoring in Ketchikan's Bear Valley*, December 1996.*

Cruise ship boilers and generators produce a variety of air pollutants, including nitrogen oxides ($NO_x$), sulfur dioxide ($SO_2$), carbon monoxide (CO), and particulates. The *Alaska Air Quality Control Plan* restricts the density of smoke (opacity) that any marine vessel can emit from its smokestacks. In general, if a ship is stationary at dock, its opacity level cannot exceed 20 percent, except for up to a total of three minutes in any one-hour period.[57]

## 3.11 NOISE

### *3.11.1 Regulatory Overview*

The FHWA established Noise Abatement Criteria (NAC) to help determine the noise impacts associated with highway development projects. The NAC are noise levels assigned to various land uses (e.g., picnic areas, churches, commercial land, and undeveloped land) grouped by their sensitivity to traffic noise levels. The NAC represent the maximum traffic noise levels that allow uninterrupted use within each activity category. Table 3-18 lists the five land activity categories included in the FHWA-established NAC, and the average sound level (occurring over a one-hour period, or $L_{eq}$[h]), associated with each activity category. Sound levels are reported in decibels using the A-weighted scale[58] (dB[A]).

**TABLE 3-18**
**NOISE ABATEMENT CRITERIA**

| *Activity Category* | $L_{eq}$ (h) | *Description of Activity Category* |
|---|---|---|
| A | 57 dB(A) (Exterior) | Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. |
| B | 67 dB(A) (Exterior) | Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals. |
| C | 72 dB(A) (Exterior) | Developed lands, properties, or activities not included in Categories A or B above. |
| D | No Limit | Undeveloped Lands |
| E | 52 dB(A) (Interior) | Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums. |

*Source: FHWA, Federal-Aid Highway Program Manual 7-7-3, "Procedures for Abatement of Highway Traffic Noise and Construction Noise," dated August 1982.*

The DOT&PF states that "the commitment to minimize noise impacts and enhance the noise environment must be fulfilled through prudent application of FHWA's noise regulations - 23 CFR

[57] 18 AAC 50.070 Alaska Air Quality Control Plan

[58] *Because human hearing is not equally sensitive to all frequencies of sound, certain frequencies are given more "weight". The A-weighted scale corresponds to the sensitivity range for human hearing.*

Part 772, which is the primary regulatory authority regarding noise abatement criteria." According to FHWA regulation and DOT&PF policy[59], traffic noise impact occurs when the predicted noise levels on new roadway corridors:

- approach (i.e., are within 1 dB[A] of) or exceed the NAC or,
- substantially exceed (by 10 dB[A] or more) the existing noise level.

If an adverse impact (i.e., approaching or exceeding the NAC) would occur, then FHWA's regulations indicate that abatement should be considered.

### *3.11.2 Sensitive Receptors*

The only noise-sensitive receptors within the areas potentially affected by the project alternatives are residences and commercial areas; i.e., Activity Categories B and C in Table 3-18. There are no Category A areas. Large parts of Pennock and Gravina Islands are undeveloped (Category D).

Noise-sensitive receptors near the alignments of Alternatives C3(a) and C3(b) are the ten residences located along Baker Street North and Bucey Avenue North in Ketchikan. Noise-sensitive receptors near the alignments of Alternatives C4 and D1 are the 10 to 15 residential properties located in the Cambria Drive neighborhood in Ketchikan. Noise-sensitive receptors near the alignments of Alternatives F1and F3 are the few residences on Pennock Island in the vicinity of the East Channel bridge touchdown, and the few residences in the Clam Cove neighborhood on Gravina Island in the vicinity of the West Channel Bridge touchdown. There are also five to ten residences located in the Forest Park neighborhood in Ketchikan in proximity to the alignment of Alternative F1. There are no noise-sensitive receptors along the alignments of Alternative G2, G3, or G4.

### *3.11.3 Existing Noise Sources*

Noise in the project area is generally attributed to transportation: airplanes, floatplanes, helicopters, ferries, private and commercial boats, and automobiles. While these noise sources are present year-round, noise in the project area generally increases during the summer because these transportation activities increase with additional tourism and outdoor recreation activities that occur in the summer. Other common sources of noise are cruise ships (in the summer), traffic on Tongass Avenue, and general industrial and commercial activities.

Existing traffic noise levels were monitored at the nearest sensitive receptors to the project alternatives and estimated for segments of Tongass Avenue, Mill Street, and Stedman Street using the FHWA Traffic Noise Model.

Noise measurements were collected near four residences in areas where the project alternatives have the greatest potential for causing impacts.[60] Table 3-19 presents the existing noise levels ($L_{eq}$) for each monitoring location, the alternative nearest to each location, and the

[59] *DOT&PF,* Noise Abatement Policy*, March 1996.*

[60] *The measurement was conducted on July 1, 2003, in accordance with FHWA-PD-96-046* Measurement of Highway-Related Noise *(May 1996), using a Larson-Davis 712 Sound Level Meter.*

noise impact threshold for activity Category B, which is designated for residences. No existing noise levels exceeded the noise impact thresholds.

**TABLE 3-19**
**NOISE LEVELS AT SENSITIVE RECEPTORS**

| *Monitoring Location* | *Closest Alternative(s)* | *Existing Noise Levels in dB(A)* ($L_{eq}$) | *Noise Impact Threshold for Activity Category B (dB[A])* |
|---|---|---|---|
| Residences located at Baker and Bucey Streets | C3(a) and C3(b) | 58 | 66 |
| Residence located at Cambria Drive and Vallenar Lane | C4 and D1 | 59 | 66 |
| Residence located on Forest Park Drive approximately 325 feet east of South Tongass Highway | F1 and F3 | 55 | 66 |
| Residence located on Pennock Island in the vicinity of the proposed East Channel Bridge touchdown | F1 and F3 | 49 | 66 |

Input for the FHWA Traffic Noise Model included:

- Peak Hour (PM Peak) traffic volumes for 2000.[61]
- A proposed fleet mix for vehicle travel north of Dock Street of 92.0% Autos, 6.2% Medium Trucks, 0.4% Heavy Trucks, 1.3% Buses, and 0.13% Motorcycles.[62]
- A proposed fleet mix for vehicle travel south of Dock Street of 93.7% Autos, 4.0% Medium Trucks, 0.4% Heavy Trucks, 1.8% Buses, and 0.1% Motorcycles.[63]
- Operational speed of 25 mph for Tongass Avenue north of Schoenbar Road and 20 mph from Schoenbar Road to Deermount Avenue (same as posted speed limits).

The FHWA Traffic Noise Model defaults for options such as meteorological conditions and pavement type (i.e., 50% humidity, 68°F, average pavement type).

The model output gives traffic noise levels at various distances from the centerline of the modeled roadway. Table 3-20 provides the distance along the modeled roadway segments at which the threshold for noise impacts for Activity Category B or C is met under existing conditions; i.e., within 1 dB(A) of the NAC for those activity categories, or 66 dB(A) and 71 dB(A), respectively. In general, at distances greater than 52 feet from the centerline north of Dock Street, and 33 feet from the centerline south of Dock Streets, sound levels are at

[61] *DOT&PF,* Gravina Access Project Final Traffic Assessment Technical Memorandum*, Prepared by HDR. November 2002*

[62] Vehicle mix provided by Rick Purves, DOT&PF Traffic Engineer, to C. Snead, HDR, May 21, 2003.

[63] *Ibid.*

acceptable levels for the existing land uses along the Tongass Avenue corridor. Modeled noise levels have not been confirmed with on-site measurements.

**TABLE 3-20**
**DISTANCE TO IMPACT THRESHOLDS BASED ON EXISTING TRAFFIC**

| *Segment of Tongass Avenue* | *PHV[1] (Year 2000)* | *Distance to Traffic Noise Impact Threshold[2] (feet)* | |
|---|---|---|---|
| | | *Activity Category B 66 dB(A)* | *Activity Category C 71 dB(A)* |
| North Tongass Ave. to Ferry Terminal Access Drive | 1221 | 42 | 20 |
| Ferry Terminal Access Drive to Bryant Street | 1257 | 42 | 21 |
| Bryant Street to Carlanna Lake Dr. | 1231 | 42 | 20 |
| Carlanna Lake Dr. to Third Ave. | 1697 | 52 | 25 |
| Third Ave. to Jefferson St. | 1661 | 51 | 25 |
| Jefferson St. to Washington St. | 1551 | 48 | 24 |
| Washington St. to Schoenbar Rd. | 1614 | 50 | 25 |
| Schoenbar Rd. to Dock St. | 1591 | 42 | 20 |
| Dock St. to Mission St. | 1127 | 33 | 15 |
| Mission St. to Main St. | 752 | 29 | 14 |
| Main Street to Bawden St. | 746 | 25 | 12 |
| Bawden Street to Deermount St. | 884 | 28 | 13 |
| Deermount Street to South Tongass Highway | 802 | 26 | 12 |

*[1] PHV = peak hourly volume*

*[2] Noise impact threshold is based on FHWA guidance and DOT&PF policy for determining noise impacts; i.e., when noise levels are within 1 dB(A) of NAC.*

## 3.12 WATER QUALITY

Figure 3.15 shows the water resources in the project area. Marine water quality in the project area can be affected by discharges from seafood processing plants, timber industry activities, shipyard and other industrial activity, treated sewer system outflows, cruise ships and other vessels operating in marine waters, and sediment runoff from paved surfaces and disturbed areas. The water quality of freshwater lakes, streams, and creeks can be affected by logging activities and runoff from disturbed areas.

Seafood processing facilities in Ketchikan discharge fish waste via outfalls into deep waters in Tongass Narrows, under a National Pollutant Discharge Elimination System (NPDES) general permit for Alaskan shore-based seafood processors. As required by the permit, the discharge outfalls are situated in underwater areas that are continually flushed by strong tides.[64]

*[64] Florence Carrol, Environmental Protection Agency National Pollutant Discharge Elimination System permitter, telephone conversation with Robin Reich, HDR, regarding seafood processor outfall permits in the Ketchikan area, April 19, 2000.*

The vegetation clearing that is part of logging activities can degrade surface water by carrying sediment to nearby streams. Log transfer facilities and timber processing plants on the shoreline can also degrade water quality by discharging certain chemicals.

Cruise ships discharge treated sewage; effluent from properly functioning marine engines; and laundry, shower, and galley sink wastes ("greywater") to marine waters. In July 2001, Alaska enacted a law (AS 46.03.460 – 46.03.490) establishing the Commercial Passenger Vessel Environmental Compliance Program (a.k.a. "Cruise Ship Program") under ADEC to regulate cruise ship and ferry waste streams discharged to Alaska waters. The regulations to implement the program were effective as of November 15, 2002. Key components of the Cruise Ship Program include:

- Annual vessel registration
- Discharge limit for greywater (sink, shower, galley waters) and blackwater (treated sewage) of 200 fecal coliform colonies per 100 milliliters and 150 milligrams per liter of suspended solids
- Discharge limited to at least 1 mile from shore and 6 knots speed, unless more stringent effluent levels are demonstrated
- Sampling and testing of vessel greywater and blackwater that is discharged in Alaska marine waters
- ADEC ability to independently verify wastewater sampling and to take additional wastewater samples
- Annual environmental compliance fee
- Record keeping and reporting of vessel disposal of wastewater, hazardous waste, and garbage

Airport ferry operations in Tongass Narrows can also affect water quality as a result of engine discharge, runoff from vehicles sitting on the deck of the ferries, and runoff from the ferry terminal parking lots. These discharges are unregulated, and the existing effect on water quality is not quantified.

No major drainages would be crossed by any of the alternatives on Revillagigedo Island. Government Creek, Airport Creek, and other, lesser creeks on Gravina Island, may be affected. There is no upstream development along these Gravina Island creeks, and they drain wetland areas. As such, they generally are not turbid and have good water quality.

## 3.13 PERMITS

The COE, ADEC, USCG, and DNR generally require permits to implement projects like the Gravina Access Project build alternatives. Permits and approvals for temporary construction activities would also be necessary from COE, DNR, National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and the U.S. Environmental Protection Agency (EPA).

A Section 9 Bridge Permit from the USCG would be required for any bridge constructed over navigable waters, which includes Tongass Narrows.

The COE reviews, coordinates, and issues permits for the removal or placement of fill into wetlands and other waters of the United States under the authority of Section 404 of the Clean Water Act. A Section 404 permit would be required for all build alternatives that would impact wetlands and waters subject to Section 404 jurisdiction. Examples of regulated activities include excavation, fill, placement of piles, or blasting.

The Section 404 permit application and approval also requires:

- Endangered Species Act Section 7 consultation with NMFS and USFWS
- National Historic Preservation Act Section 106 consultation with the State Historic Preservation Office
- Coordination and conference with the Alaska Department of Fish and Game (ADF&G)
- Section 401 Water Quality Certification from ADEC
- Approval from the EPA under Section 102 of the Marine Protection, Research, and Sanctuaries Act for ocean disposal of in-water excavated materials.

Build alternatives that include structures that would cross navigable waters or result in modification of navigable waters require authorization under Section 10 of the Rivers and Harbors Act.

The COE, FHWA, and DOT&PF operate under a December 17, 1992 agreement "to streamline the NEPA and permit review process." Based on the agreement, DOT&PF has included a preliminary jurisdictional determination and a draft 404(b)(1) in Appendix L, in addition to the draft Section 10/404 permit application.

The Fishway Act and the Anadromous Fish Act are Alaska Statutes that require projects to obtain a Fish Habitat Permit from DNR for certain activities in fish bearing streams. Activities that may impact fish passage and all activities within or across anadromous fish streams require a Title 41 Fish Habitat Permit.

An NPDES construction permit is required for all construction activities that result in ground disturbance of 1 acre or greater. The EPA issues NPDES permits. Related to the NPDES permit is a Storm Water Pollution Prevention Plan (SWPPP), which must be approved by the ADEC before construction can commence.

In addition, any build alternative that falls within Alaska's coastal zone is subject to consistency review by the DNR and the Borough under the Alaska Coastal Management Program (ACMP) and the Borough's Coastal Management Plan.[65] The ACMP requires that each project in Alaska's coastal zone be reviewed to determine consistency with the statewide standards of the ACMP and the enforceable policies of the Borough's Coastal Management Plan. A finding of consistency with the ACMP must be obtained before the COE permit authorizations can be issued for the project. The Borough's Coastal Management Plan was adopted in 1984 and is in the process of being updated as part of *Ketchikan 2020* (see Section 3.19).

[65] *Ketchikan Gateway Borough Planning Department,* Coastal Management Plan.

Borough zoning, conditional use, and/or site development permits may be required. Changes to existing land uses (even if temporary, such as development of construction staging areas), often require Borough review and approval of a zoning permit. Planned structures may also require a conditional use permit or variance, and modification of platted parcels would require a site development permit.

## 3.14 WETLANDS AND VEGETATION

Figure 3.16 (Biological Resources [Wetlands and Uplands]) shows the locations of the upland and wetland areas in the project area.

### *3.14.1 Wetlands*

Executive Order 11990, "Protection of Wetlands," requires FHWA to avoid and minimize harm to wetlands. The project must avoid wetlands unless there is "no practicable alternative," and if it uses wetlands, it must undergo "all possible planning to minimize harm" to wetlands.

The project area has four types of wetlands: forested wetlands, shrub/scrub wetlands, open "muskeg"-type wetlands, and intertidal marshes and meadows. The description of wetlands in the project area is based on field surveys conducted by the project team in January and June of 2000.[66]

#### 3.14.1.1 Forested Wetlands

Forested wetlands are prominent northwest of the airport and on the forested slopes of Revillagigedo Island. They are generally drier than other wetlands, either because they are on topographically higher or steeper sites, or because their substrates drain better internally. They are found on moderately sloping lands on Revillagigedo Island, along larger creeks, and as a fringe along the beaches of Gravina and Pennock Islands. They are also interspersed with the muskeg wetlands. A mix of conifer species (including shore pine, red and yellow cedar, western hemlock, and Sitka spruce) characterize forested wetlands. The trees appear stunted relative to those that are found in a better-drained forest. The understory supports a dense growth of blueberry, huckleberry, rusty menziesia, salal, and an herb ground cover. The functions of forested wetlands largely depend on their location. They serve as important wildlife habitat along beaches and streams, may help to moderate stream flows, and help sustain the habitat functions of streams.

#### 3.14.1.2 Shrub/Scrub Wetlands

This wetland type dominates areas adjacent to muskeg wetlands (see below) and other areas where tree growth is limited by soil saturation. The tree canopy is sparse enough to allow light to penetrate, promoting a dense shrub and scrub tree understory. Scrub/shrub wetlands often form slightly drier "islands" within the muskegs. They also tend to occur on the slightly better-drained (sloping) ground along the streams that run through muskegs. This wetland type has an open canopy of western or mountain hemlock. Shore pine, small Sitka spruce, and red and yellow cedar may also be present. Tall blueberry and rusty menziesia form a dense shrub layer, with a ground cover of bunchberry, deer cabbage, skunk cabbage, fernleaf goldthread, and

[66] *DOT&PF,* Gravina Access Project Biology Report (Draft)*, prepared by HDR and Pentec Environmental, October 2001.*

sphagnum moss. As with forested wetlands, shrub/scrub wetlands may moderate stream flows, stabilize stream banks, and provide important wildlife habitat.

#### 3.14.1.3 Muskegs

Open, muskeg-type wetlands are the dominant wetland type on Pennock Island and in the areas west and south of the airport on Gravina Island. These open wetlands are intricately interspersed with small patches of forested or shrub wetland. Most of the open wetlands can be loosely described as short sedge fens, which are expected to be moderately nutrient rich and productive. Some richer, tall sedge-dominated wetlands also exist in limited areas, as do more acidic and nutrient-poor bog-type wetlands. The dominant low sedge fens are characterized by low shrub and herb vegetation, such as sweetgale, blueberry, crowberry, and short sedges, and by water pooled on the surface. Many of the wetlands are moderately sloped and have water flowing through them. Flowing water, as well as contact between that water and mineral soil, usually leads to a biological community that is more nutrient-rich and productive. Because they tend to have water flowing through them, muskegs may export organic material that supports downstream ecosystems and help maintain natural chemistry and low flows in the creeks. The muskeg areas nearest creeks are important for maintaining base flows to those creeks. Little is known about wildlife use of these extensive habitats. Deer and black bear feed in them seasonally, and some water birds, including sandhill cranes, passerine species, and blue grouse are known to use these areas. Waterfowl often use intermixed open freshwater ponds as resting and nesting habitat. Humans use these areas for berry-harvesting.

#### 3.14.1.4 Intertidal Marshes and Meadows

Although relatively scarce in Southeast Alaska, estuarine meadows exist along the shoreline of Gravina Island. At elevations near the highest tides, grasses dominate these meadows, and sedges and herbs are prominent near the more average high-tide elevations. These meadows may be supported by seepage of freshwater out of the beach gravels. They are highly productive habitats, and organic matter produced within them washes into the marine ecosystem, where it supports food webs. The beach meadows are important feeding areas for many terrestrial and aquatic species of wildlife, including deer, black bear, river otter, mink, shorebirds, waterfowl, and songbirds. They provide succulent forage in spring, when other habitat types may be snow-covered. They also serve as nurseries for young fish.

### *3.14.2 Vegetation*

The project area uplands are dominated by coniferous forests and the major climax forest type is western hemlock and Sitka spruce. Other tree species in the forest include western red cedar, yellow cedar, mountain hemlock, red alder, and lodgepole pine. The understory includes skunk cabbage, salal, devil's club, rusty menziesia, Sitka alder, salmonberry, thimbleberry, blueberry, huckleberry, ferns, mosses, and lichens.[67]

[67] *Ketchikan Gateway Borough Planning Department,* Ketchikan District Coastal Management Program*, prepared by Susan A. Dickinson, 1994.*

## 3.15 WATER BODIES AND WILDLIFE

Figure 3.15 (Water Resources) shows the lakes, creeks, and watersheds in the project area. Figure 3.17 (Other Biological Resources) shows the areas of particular importance to the wildlife in the project area, including eelgrass beds, anadromous streams, herring spawning areas, and bald eagle nesting sites.

### *3.15.1 Major Water Bodies*

Surface water in the project area flows into Tongass Narrows, through streams, direct sheetflow runoff, and shallow subsurface flow. Major streams in the project area are: Airport Creek, Government Creek, and Clam Cove Creek on Gravina Island; and Hoadley Creek, Ketchikan Creek, and Carlanna Creek on Revillagigedo Island. There are no major water bodies on Pennock Island.

No major water body or watershed on Revillagigedo or Pennock Island would be traversed by any of the project alternatives. In the areas on Revillagigedo and Pennock Islands where the alternatives would be located, surface runoff is not collected in creeks and is likely to flow directly into Tongass Narrows as sheet flow or in small channels that discharge via the storm drain system, or as shallow subsurface flow. The major watersheds traversed by the proposed alternatives on Gravina Island are Airport Creek, Government Creek, and Clam Cove Creek. There are no flow data available for any of the streams that would be crossed by the project alternatives.

#### 3.15.1.1 Tongass Narrows

Tongass Narrows is characterized by shorelines of steep bedrock or coarse gravel, cobble, and boulders; strong tidal currents; and unusually large tidal ranges (25 feet or more). Many of the lower intertidal and shallow subtidal areas are sandy or mixed gravel, sand, and shell, with varied amounts of silt. Several small natural coves and areas behind constructed breakwaters provide wave and current protection for anchorages and marine habitats.

#### 3.15.1.2 Airport Creek

The Airport Creek watershed encompasses approximately 1,835 acres. The creek flows northward and discharges into a protected cove north of the airport.

#### 3.15.1.3 Government Creek

The Government Creek watershed encompasses approximately 1,870 acres. The creek flows northward and discharges into a protected cove south of the airport.

#### 3.15.1.4 Clam Cove Creek

The Clam Cove watershed encompasses approximately 3,533 acres. The watershed is characterized by numerous lakes and small streams, including Clam Cove Creek, which flows directly into Clam Cove and Tongass Narrows.

## *3.15.2 Ponds*

There are many small ponds on Gravina Island. These ponds tend to have no outlets, and therefore do not provide a source of nutrients to any downgradient water bodies; however, they do provide wildlife habitat.

## *3.15.3 Marine Habitats*

### 3.15.3.1 Intertidal Zone

Field investigations have identified 136 plant and 151 animal taxa in the intertidal zone in the project area.[68] In areas where natural coarse gravel/cobble/boulder shorelines occur, the dominant species are rockweed, barnacles, snails, and crab. In areas where seastars are limited, the intertidal habitat areas support abundant mussel populations. Where somewhat sheltered beaches exist, hardshelled littleneck and butter clams are often abundant.

### 3.15.3.2 Subtidal Zone

The subtidal margins of Tongass Narrows are characterized by steeply sloping bedrock or coarse gravel/cobble bottoms extending from the lower intertidal zone to the deeper, flatter center of the channel at depths of –80 to –150 feet mean lower low water (MLLW).

For the most part, these subtidal slopes are swept by strong tidal currents and support a number of kelp and other algal species down to depths of about –40 feet MLLW. In spring and summer, many of these rocky areas support a canopy of bull kelp. At depths below –40 feet MLLW, the bottom becomes nearly barren sand and gravel. The most abundant subtidal organism observed in the project area in the winter was sea cucumber.

Shallow subtidal areas that are protected from direct impact of the currents, in small coves or behind breakwaters, have gradually sloping sandy bottoms that often support healthy eelgrass beds. Locations of known eelgrass beds are shown on Figure 3.17.

## *3.15.4 Wildlife—Aquatic Species*

### 3.15.4.1 Marine Mammals

Eight species of marine mammals are commonly found in the project area. These are harbor seals, Steller sea lions, humpback whales, killer whales, Dall porpoises, Pacific white-sided dolphins, minke whales, and harbor porpoises. Grey whales are sometimes observed in the area off Vallener Point.

Harbor seals are frequent inhabitants of Tongass Narrows (including the Ketchikan waterfront area). They feed on pelagic and bottom dwelling fishes, crustaceans, and octopus.[69] Humpback whales and Steller sea lions are discussed in Section 3.20, Threatened or Endangered Species.

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[68] *DOT&PF,* Gravina Access Project Biology Report (Draft)*, prepared by HDR and Pentec Environmental, October 2001.*

[69] *L.F. Lowry, and Frost, K.J., Feeding and trophic relationships of* Phocid *seals and walruses in the eastern Bering Sea, D.W. Hood and J. A. Calder (eds.),* The Eastern Bering Sea Shelf: Oceanography and Resources*, Vol. 2, Office of Marine Pollution Assessment, National Oceanic and Atmospheric Administration, 1981, Pages 813-824.*

### 3.15.4.2 Anadromous Fish

Anadromous fish (fish that return to fresh water to spawn) flourish in Southeast Alaska. The project area contains several streams that support anadromous fish: Airport Creek, Government Creek, and several other small, unnamed creeks. In the project area, large populations of anadromous fish such as salmon (five species), cutthroat and steelhead trout, and Dolly Varden provide food for bears, wolves, bald eagles, and other animals, and are valuable to commercial and sport fishers. The *Essential Fish Habitat Assessment Technical Memorandum* (Appendix O) provides information on the habitat requirements for salmonid species.

### 3.15.4.3 Marine Fish

While Southeast Alaska rivers and streams have relatively few species of resident fish, marine waters contain hundreds of fish species. Flatfish, Pacific cod, rockfish, sculpin, halibut, skate, and sablefish are abundant, and huge schools of herring, smelt, capelin, and Pacific sand lance collectively provide the food base for salmon, trout, and char.[70] Other fish species that live in the marine waters of the project area are yelloweye, shortraker, rougheye, and dusky rockfish, walleye pollock, lingcod, Pacific Ocean perch, and arrowtooth flounder.[71] The ADF&G and the National Marine Fisheries Service (NMFS; a.k.a. NOAA Fisheries) have identified Pacific herring and Pacific halibut as important in the project area.

***Pacific Herring.*** Pacific herring spawn during the spring in eelgrass or rockweed beds at the north end of Gravina Island.[72]

***Pacific Halibut.*** Halibut eat a large variety of fishes (including cod, turbot, and pollock) and some invertebrates such as crab and shrimp. They sometimes leave the ocean bottom to feed on pelagic fish, such as sand lance and herring. The fish spawn in the winter months. Eggs and larvae float for up to six months until they are carried to shallower waters by prevailing currents to begin life as bottom-dwellers. Older fish often use both shallow and deep waters over the annual cycle.[73]

### 3.15.4.4 Essential Fish Habitat

The Magnuson-Stevens Fishery and Conservation Management Act requires analysis of "Essential Fish Habitat" (EFH). The NMFS (NOAA Fisheries) is responsible for delineating EFH. In the case of anadromous fish streams (principally salmon), NOAA Fisheries has designated the anadromous fish maps prepared by ADF&G as the definition of EFH.

In the project area, Tongass Narrows is designated EFH for 11 species of ground fish and five species of salmon. Anadromous fish streams designated as EFH for salmon that could be

[70] *R.M. O'Clair, Armstrong, R.H., and Carstensen, R.,* The Nature of Southeast Alaska: A Guide to Plants, Animals, and Habitats, *(Seattle, WA: Alaska Northwest Books), 1997.*

[71] *Linda Shaw, NMFS Juneau, personal communication with Darcy Richards, HDR regarding essential fish habitat, 1999.*

[72] *Scott Walker, ADF&G Assistant Area Management Biologist, email to Robin Reich, HDR regarding herring, April 4, 2000.*

[73] *Alaska Department of Fish and Game, Division of Wildlife Conservation,* Wildlife Notebook Series, *1999.*

affected by the project are Government Creek, Airport Creek, and two unnamed streams on Gravina Island, both of them southeast of Government Creek and the airport, as shown in Figure 3.15. See the project's EFH technical report in Appendix O for additional detail.

Most fish occur in Tongass Narrows primarily as late juveniles and adults and may use Tongass Narrows as a migratory corridor to other rearing areas in nearby bays and intertidal areas. Table 3-21 and Table 3-22 show the species (and their life stages) that occur in Tongass Narrows, Government Creek, Airport Creek, and two other unnamed anadromous fish streams.

**TABLE 3-21**
**ESSENTIAL FISH HABITAT GROUNDFISH SPECIES IN PROJECT AREA**

| *Species* | *Egg* | *Larvae* | *Late Juvenile* | *Adult* | *Spawning* |
|---|---|---|---|---|---|
| Pacific Ocean Perch | | | X | X | |
| Yelloweye Rockfish | | | X | X | |
| Shortraker | | | X | X | |
| Rougheye Rockfish | | | X | X | |
| Dusky Rockfish | | | X | X | |
| Walleye Pollock | X | | | X | |
| Sablefish | | | X | X | |
| Pacific Cod | | | X | X | |
| Arrowtooth Flounder | | | X | X | |
| Sculpin spp. | | | X | X | |
| Skates spp. | | | X | X | |

**TABLE 3-22**
**ESSENTIAL FISH HABITAT SALMON SPECIES IN PROJECT AREA**

| *Species* | *Egg and Larvae – fresh water* | *Juvenile – fresh water* | *Juvenile – estuarine* | *Juvenile – marine* | *Adult – marine waters* | *Spawning – fresh water only* |
|---|---|---|---|---|---|---|
| Coho salmon | X | X | X | X | X | X |
| Chum salmon | X | X | X | X | X | X |
| Pink salmon | X | X | X | X | X | X |
| Chinook salmon* | | | X | X | X | |
| Sockeye salmon* | | | | X | X | |

** Only juveniles and adults of these species are found in Tongass Narrows within the project area.*

### *3.15.5 Wildlife—Amphibians*

Two amphibian species likely inhabit the project area: rough-skinned newt and the western toad.[74] Rough-skinned newt salamanders may inhabit creeks and wet areas.[75] Western toads breed in freshwater wetlands and move to terrestrial, nonforested areas to feed on insects and other small animals during adulthood.

### *3.15.6 Wildlife—Birds*

About 160 species of birds nest in or near Ketchikan.[76] Around Revillagigedo and Gravina Islands and the surrounding waters, local birdwatchers have observed approximately 225 species of birds.[77] In the project area, birds dwell in a variety of habitats, including marine waters, intertidal areas, freshwater wetlands, and forests.

Waterfowl, including oldsquaw, bufflehead, common goldeneye, Barrow's goldeneye, harlequin duck, white-winged scoter, surf scoter, common merganser, and red-breasted merganser, forage in the rocky intertidal zone of Tongass Narrows during high tide.[78] They primarily feed on invertebrates and small fish in the ice-free waters along the coastline during the winter and breed in more northern areas of Alaska during the summer.

Other species, primarily gulls, northwestern crows, and common ravens, feed on invertebrates and opportunistically scavenge in the rocky intertidal areas during low tide. In the early spring, surf scoters and gulls, along with other species, gather and feed upon herring spawn on eelgrass and rockweed. The Totem Bight area and the northern end of Gravina Island are popular feeding areas. Gulls follow herring as they move northward along the coastline.[79]

Some migratory waterfowl and summer seabirds concentrate just north of Pennock Island adjacent to downtown Ketchikan and at the head of Ward Cove.[80] Sandhill cranes have been observed on Gravina Island on airport property south of Government Creek. Shorebird species, including western sandpipers and red-necked phalarope, feed and stage in estuarine areas within the project area during the spring and fall migrations. However, larger estuaries outside the project area on Gravina Island provide more important habitat to birds migrating northward.[81] No seabird colonies exist within the project area.[82]

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[74] *Mike Brown, USFS, Ketchikan, personal communication with Robin Reich, HDR, on February 16, 2000; Reich, Robin, HDR, Amphibians in the Gravina Access Project Area, memorandum to file, 2000.*

[75] *D.B. Wake, Jockosch, E.J., and Papenfuss, T.J., Does Batrachoseps Occur in Alaska?* Herpetological Review *29(1): 12-14, 1998.*

[76] *R.M. O'Clair,* Guide to Plants.

[77] *Steve Heinl and Goucher, Teri,* Checklist of Birds of the Ketchikan Area, Alaska*, March 2000.*

[78] *R.M. O'Clair, and C.E. O'Clair,* Southeast Alaska's Rock Shores Animals. *Plant Press, Auke Bay, Alaska, 1998; and Heinl, Steve,* Some Peak Seasonal Counts of Waterbirds on the Ketchikan Road System*, Ketchikan, Alaska, 2000.*

[79] *Ibid.*

[80] *Ketchikan Gateway Borough Planning Department,* Coastal Management Program.

[81] *Steve Heinl,* Some Peak Seasonal Counts of Waterbirds on the Ketchikan Road System*, Ketchikan, Alaska, 2000.*

[82] *USFWS, Beringian Seabird Colony Catalog website, <http://164.159.151.5/seabird/index.html> Brockman, Steve (USFWS, Ketchikan), personal communication, Robin Reich, January 13, 2000; Brown, Mike (USFS, Ketchikan), personal communication,*

Rock doves, chestnut-backed chickadees, winter wren, and varied thrush breed and inhabit forests of the project area year-round. Other passerines, including Swainson's thrush, orange-crowned warbler, and Townsend's warbler, breed in the area forests in the summer. American robin, dark-eyed junco, golden-crowned kinglet, Steller jay, and several warblers use beach-fringe forests and scrub-shrub communities. Greater yellowlegs may nest in the freshwater fens.[83] Shorebirds, passerine species, and blue grouse are known to use muskeg habitats. Waterfowl often use freshwater ponds within the muskegs as resting and nesting habitat.

The northern goshawk is an uncommon forest-dwelling raptor that is likely to occur on Gravina Island. Goshawks can be found foraging in dense deciduous and coniferous forests. They nest exclusively in old growth and mature forest habitat. Northern goshawks may use the project area as foraging habitat.

Bald eagles are protected under the Bald and Golden Eagle Protection Act and any impacts from proposed project activities must consider impacts to eagles. The bald eagle population in Southeast Alaska is stable.[84] The Audubon Christmas Bird Count identified 53 bald eagles in the Ketchikan area in December 1999. There are 16 documented Bald eagle nests within the project area (see Figure 3.17). Bald eagles are common along the shorelines of Tongass Narrows where they scavenge and prey on fish in the intertidal areas.

### *3.15.7 Wildlife—Land Mammals*

The project area is home to approximately 50 species of land mammals. While much information exists on larger land mammals, the distribution and numbers of many small mammals remain unknown. The USFWS and the ADF&G identify Sitka black-tailed deer, Alexander Archipelago wolf, and black bear as important species in the project area.

***Sitka Black-Tailed Deer.*** The Sitka black-tailed deer is native to coastal rain forests of Southeast Alaska. During the winter, deer inhabit south- and west-facing slopes up to 800 feet elevation and dense timber stands.[85] Alaska deer populations are dynamic and usually fluctuate with the severity of the winters. However, the Ketchikan area rarely experiences severe winters and high winter deer mortality.[86] Since the 1980s, the deer population estimates for Gravina Island have fluctuated between 350 and 915; populations on Gravina Island and southern Revillagigedo Island are 14 to 43 deer per square mile, respectively.[87]

The deer population on Gravina Island provides food for wolves and bear. The island is also a popular deer hunting area for humans; however, the middle of the island provides a refuge for

*Robin Reich, February 16, 2000; Heinl, Steve,* Some Peak Seasonal Counts of Waterbirds on the Ketchikan Road System*, Ketchikan, Alaska, 2000.*

[83] *Jon Nickles, USFWS, Anchorage, letter to Colonel Peter A. Topp regarding Tongass Narrows 504 2-9700001, May 22, 1997.*

[84] *Ketchikan Gateway Borough Planning Department,* Coastal Management Program.

[85] *Dave Person, (ADF&G Division of Wildlife Conservation, Ketchikan), telephone conversation with Robin Reich, HDR, regarding wolves and deer on Gravina Island, 2000.*

[86] *Ibid.*

[87] *ADF&G, Division of Wildlife Conservation,* Sitka Black-tailed Deer Management Report for 1 July 1996 to 30 June 1998 for Game Management Unit 1A*, 1998.*

deer from hunters because it is not easily accessible.[88] ADF&G manages deer hunting on the island, and considers the size of its resident deer population to be healthy.[89]

***Alexander Archipelago Wolf.*** In Southeast Alaska, the wolf population varies closely with the deer population. According to the ADF&G, one pack of Alexander Archipelago wolves with 10 to 12 individuals inhabited Gravina Island in the fall of 1999, and four wolves were shot or trapped during the following season.[90] These numbers have remained stable to April 2003. The wolves hunt prey in a variety of habitats, including open wetlands and forests. Deer comprise 80 percent of their diet on Gravina Island, and the pack is healthy because the deer population is stable. The wolves also feed on beaver and salmon, and occasionally scavenge or hunt marine mammals.[91]

***Black Bear.*** Black bears inhabit most of forested Alaska. They feed on freshly sprouted green vegetation in the spring and on salmon during the summer and fall during fish runs. Berries, especially blueberries, are an important food in the late summer and fall. Breeding takes place from June through July. The cubs, usually two, are born in winter or early spring. The bears hibernate during the winter in rock cavities, hollow trees, and self-made excavations located from sea level to alpine elevations.[92] The bear population in and around Gravina Island is approximately 1.4 bears per square mile. This number has not fluctuated much in the last 10 years, and the bear population overall has remained relatively low but stable. Gravina and Revillagigedo Islands do not contain many salmon streams or berries to support large populations of black bears.[93]

The population of black bears in the Borough is approximately 1.5 per square mile.[94] The ADF&G commonly relocates black bears from the Borough to the southern part of Southeast Alaska to reduce the danger to residents.[95] Humans hunt black bear on Gravina and Revillagigedo Islands. From 1984 through 1992, the average bear harvest was 66 per season; from 1993 through 1995, it was 43 per season.

## 3.16 FLOODPLAINS

Executive Order 11988, "Floodplain Management," requires FHWA to follow procedures for assessing and avoiding potential flood impacts. The Federal Emergency Management Agency (FEMA) has mapped the expected 100-year floodplain for a small portion of the Ketchikan

[88] *Person, telephone conversation Robin Reich, 2000.*

[89] *ADF&G, Division of Wildlife Conservation,* Sitka Black-tailed Deer Management Report for 1 July 1996 to 30 June 1998 for Game Management Unit 1A*, 1998.*

[90] *Person, telephone conversation Robin Reich, 2000.*

[91] *Ibid.*

[92] *ADF&G, Division of Wildlife Conservation,* Wildlife Notebook Series, *1999.*

[93] *Porter, Boyd, ADF&G Ketchikan Area Biologist, telephone conversation with Sirena Brownlee, HDR Alaska. On April 30, 2003.*

[94] *ADF&G, Division of Wildlife Conservation,* Black Bear Survey—Inventory Management Report for 1 July 1992 to 30 June 1995 for Game Management Unit 1A*, 1995.*

[95] *Boyd Porter, ADF&G, Division of Wildlife Conservation, meeting in Ketchikan with Robin Reich, HDR, regarding wildlife in the Ketchikan area, April 12, 2000.*

Gateway Borough (i.e., primary population areas).[96] This floodplain is the extent of a flood that, statistically, can be expected to occur once every 100 years. The area included in the FEMA study extends from 0.5 mile north of Carlanna Creek to the USCG Station in Ketchikan. According to the FEMA maps, much of the Ketchikan waterfront lies within the floodplain of a 100-year flood. See Figure 3.15 (Water Resources).

## 3.17 WILD AND SCENIC RIVERS

There are no national or state-designated wild or scenic rivers in the project area.

## 3.18 COASTAL BARRIERS

There are no coastal barriers, as identified in the Coastal Barriers Resources Act, in the project area.

## 3.19 COASTAL ZONE

In 1972, the U.S. Congress passed the federal Coastal Zone Management Act to create a "partnership between state and local governments in the planning and management of coastal resources." In 1977, the State of Alaska passed the Alaska Coastal Management Act. The ACMP provides statewide policy and guidance to projects proposed within the Alaska Coastal Boundary.

District coastal management programs include a locally approved Coastal Management Plan consistent with the ACMP statewide development standards. Once approved, the local plan becomes part of the ACMP and mandates that state and federal agencies take actions on local permits consistent with the policies of the local plan and the statewide standards. These standards address coastal development; recreation; energy facilities; transportation; utilities; fish and seafood processing; timber harvesting and processing; mining and mineral processing; subsistence; coastal habitats; air, land, and water quality; and historic, prehistoric, and archaeological resources.

The Borough initiated its Coastal Management Plan in 1978 and approved its first plan 1984. A minor revision to the plan was made in 1989. According to the existing 1984 plan,[97] the key advantages of participating in the program are:

- An opportunity for increased local control; all Federal and State agencies exercising authority within the local planning area must do so in a manner consistent with local coastal management policies.
- Coordination of comprehensive resource planning and management with state and federal agencies.
- The opportunity to form special agreements among various levels of government on issues regarding the management of coastal resources, such as permit simplification.

[96] *FEMA, Flood Insurance Rate Maps for the City of Ketchikan, Ketchikan Gateway Borough, Community Panel Number 020003 0001 A and B, 1990.*

[97] *Ketchikan Gateway Borough Planning Department,* Coastal Management Plan.

- Funding for planning and implementation.

In 2002, the Borough prepared an update of the Coastal Management Plan. The document is an internal draft that has yet to be finalized.

## 3.20 THREATENED OR ENDANGERED SPECIES

Currently, there are no species under the jurisdiction of the USFWS listed as threatened and endangered under the Endangered Species Act in the project area. However, the NMFS lists two species within the project area as endangered or threatened: the Steller sea lion and the humpback whale. Both species are additionally protected under the Marine Mammal Protection Act of 1972.

### *3.20.1 Humpback Whale*

The humpback whale was federally listed as endangered in 1966. Before the mechanization of commercial whaling, the population of humpback whales was about 15,000; today, it is estimated at 2,000. More than 500 humpback whales inhabit the marine waters near Southeast Alaska during the summer.[98] Humpback whales commonly feed and breed over shallow banks but may traverse the open ocean during migration. They prey on small schooling fish such as herring and swarms of krill by using bubbles that concentrate prey, feeding in formation, herding prey, and lunge feeding.[99]

### *3.20.2 Steller Sea Lion*

The Steller sea lion was federally listed as threatened under the Endangered Species Act in 1990. Annual counts of Steller sea lions between 1985 and 1990 indicated that populations in Tongass Narrows were relatively large and stable.[100] They feed on a wide variety of prey such pollock, flounder, herring, crab, rockfish, cod, salmon, squid, and octopus. Feeding occurs from the intertidal zone to the continental shelf.[101] Steller sea lions can be found feeding in Tongass Narrows; however, there are no established haul-out sites in Tongass Narrows.

## 3.21 HISTORIC AND ARCHEOLOGICAL RESOURCES

### *3.21.1 Resources in the Project Area*

In accordance with Section 106 of the National Historic Preservation Act,[102] the Gravina Access Project team initiated the Section 106 process in 1999 to characterize the potential impacts of the project alternatives on historic and archeological resources. This effort included consultation with the Alaska State Historic Preservation Office (SHPO); literature review; field

[98] *S.O. MacDonald, and Cook, J.A.,* The Mammal Fauna of Southeast Alaska, *University of Alaska Fairbanks, 1999.*

[99] *Kate Wynne,* Guide to Marine Mammals of Alaska*, University of Alaska Fairbanks, 1997.*

[100] *Gary Frietag, personal communication to HDR, February 23, 2000.*

[101] *ADF&G, Wildlife Notebook Series: Steller Sea Lions, http://www.state.ak.us/adfg/notebook/marine/sealion.htm, September 5, 2002.*

[102] *National Historic Preservation Act, as amended (16 USC 470) and associated regulations (36 CFR 800).*

reconnaissance; consultation with the Ketchikan city and borough governments (the City of Ketchikan is the certified local government), and consultation with Tribal entities, including the Organized Village of Saxman, the Ketchikan Indian Corporation Tribal Council, and the Cape Fox Corporation. Cultural Resource Consultants produced documents and memoranda in March 2000, November 2001, July 2002, October 2002, and May 2003, each providing additional information as project planning progressed and alternatives were changed. The primary on-the-ground reconnaissance surveys were completed in the summers of 2001 and 2002. The literature review and field reconnaissance efforts are summarized below.

The early historic Native peoples of the Ketchikan area were principally the Tongass (Tan-ta kwan) Tlingit, who used portions of Revillagigedo and Gravina Islands. More generally, Native peoples are thought to have used Southeast Alaska coastal areas for at least 9,000 years. Cape Fox Natives founded Saxman in 1894.

Captain George Vancouver sailed along the western shore of Gravina Island in 1793 but did not explore farther east. Ketchikan began with three Tlingit houses near Ketchikan Creek, and a fish saltery was built there in 1884. A trading post was established in 1890, and Ketchikan incorporated as a city in 1900. The population grew with the gold rush and continued to grow with the mining, fishing, and timber industries.

#### 3.21.1.1 Resource Inventory: NRHP and AHRS Sites

This section describes results of a general literature review. The properties specifically associated with the Area of Potential Effect (APE) for Gravina Access alternatives are described in the following section.

Nineteen properties in Ketchikan and Saxman are listed on the National Register of Historic Places (NRHP), and another 30 properties have been determined to be eligible for NRHP listing. The Alaska Heritage Resources Survey (AHRS) lists approximately 250 archeological and historical properties in the general project area, of which the vast majority are historic buildings concentrated in Ketchikan. Very few of these are within the APE (see below).

#### 3.21.1.2 Prehistoric Sites

Ethnographic accounts mention a number of localities used by the Tlingit in the Ketchikan area. Four prehistoric archaeological sites have been officially recorded on the AHRS. However, much of the project area has not been intensively inventoried, and the possibility of locating additional sites should not be ruled out. The few known prehistoric sites in the Ketchikan area are along the coast.

#### 3.21.1.3 Historic Sites

In addition to the properties listed in the AHRS, there are numerous historic sites along the shores of Tongass Narrows mentioned in Roppel's geographical and historical guide to Revillagigedo and Gravina Islands.[103] Other sites are depicted on various federal surveys, which are invaluable sources of detailed information on the early settlement of Gravina and Pennock Islands.

[103] *Patricia Roppel,* Land of Mists, Revillagigedo & Gravina Islands, Misty Fiords National Monument, *Farwest Research, Wrangell, AK, 1998.*

On Pennock Island, opposite Saxman, there is a late Nineteenth Century and early Twentieth Century cemetery.[104] This was originally a burial ground of the Saxman Tlingit, although the people of Ketchikan also used it.[105] The cemetery is south of the project alternatives.

#### 3.21.1.4 Sites Found During Field Visits

Field visits for this project near the potential alignments resulted in the discovery of several previously unknown sites. These are further described in the following section.

### *3.21.2 Area of Potential Effect and Resources Near Alternative Alignments*

An APE is "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR § 800.16[d]). The APE for the Gravina Access Project is generally linear, but is influenced by the scale and nature of the undertaking, and it varies in width for different kinds of potential impacts. For construction-related (temporary) impacts and permanent direct impacts, the APE encompasses the project footprint and a 100-foot wide buffer zone around project facilities and to either side of the road cut or fill limits (or to either side of a bridge). For direct (permanent) visual impacts, the APE includes a zone 0.25 mile wide along bridge structures.

The natural scenic quality of Ketchikan and Tongass Narrows and the juxtaposition of generally compatible urban and natural landscape elements define the overall visual quality of the area. Some of the build alternatives under consideration in the Gravina Access Project would change existing views at key viewpoints throughout the project area. In general, the bridge alternatives (Alternatives C3[a], C3[b], C4, D1, F1, and F3) have greater potential for visual impacts than the ferry alternatives (Alternatives G2, G3, and G4). These impacts may be most notable in close proximity to the bridge structures, which, to varying degrees, would represent new visual elements in most viewsheds.[106] For this reason, each of the bridge alternatives includes a visual impact zone extending 0.25 mile around bridge structures. The potential for visual impacts from the ferry alternatives is low, because the area along Tongass Narrows already has a waterfront character and setting. Therefore, the area within which the ferry alternatives may have a visual effect on historic properties is the same as the APE for other direct and construction-related impacts.

The following paragraphs describe the historic and archeological resources in the project area potentially affected by the alternatives. The information provided is based on a review of available information and field reconnaissance. To protect these resources, as suggested in FHWA Technical Advisory T6640.8A, their locations are not shown.

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[104] *Sealaska Corporation, Native Cemetery & Historic Sites of Southeast Alaska, prepared by Wilsey & Ham, Seattle, WA, 1975.*

[105] *Roppel,* Land of Mists.

[106] *Millard+Peters Architects. 2001. Draft Gravina Access Project Visual Impacts Assessment Technical Memorandum. Prepared for the State of Alaska Department of Transportation and Public Facilities, Juneau*

### 3.21.2.1 Alternatives C3(a), C3(b), C4, D1, and G4

There are no known or suspected historic or archeological resources within the APE for Alternatives C3(a), C3(b), C4, D1, and G4 on Revillagigedo Island or in the vicinity of these alignments on Gravina Island.

### 3.21.2.2 Alternative F1 (Preferred)

#### Revillagigedo Island

The alignment of Alternative F1 on Revillagigedo Island would be 2,400 feet from the center of the USCG Station, which includes four buildings and structures that have been determined by the USCG to be eligible for inclusion in the NRHP; all other USCG buildings have been found not eligible. Those eligible include an administration building (KET-279), a buoy shed (KET-542), an explosives bunker (KET-546), and a machine gun emplacement (KET-548). There are also six culturally modified trees (CMTs) near the Commanding Officer's Quarters and the rifle range.[107] These sites are located outside the APE, including the APE for visual effects.

Alternative F1 would cross Tongass Avenue just southeast of a block of private property that includes a Craftsman-style house (KET-776). Located at 1749 Tongass Avenue, this wood-framed dwelling is similar to many built in the Ketchikan area during the 1920s economic boom.[108] This house is within the APE for visual effect and outside the APE for other direct effects. A preliminary determination of eligibility for this project has determined that the house is not eligible for the National Register.[109]

An old Ketchikan dump (KET-435) is within the APE for visual effects, but is outside the area for physical effects. This site is located at the southern end of the USCG Station property. Dating as early as 1926, it consists of a scatter of "artifacts in the intertidal zone along with an artifact-laden organic soil horizon exposed in the marine cutbank."[110] This site is outside the APE for permanent, direct impacts, but inside the area for potential visual effects. However, the dump is not considered to have any visual qualities that could be disturbed.

#### Pennock Island

On the east side of Pennock Island, the Alternative F1 East Channel bridge would touch down near the boundary between the parcels identified as U.S. Surveys 1562 and 3316. The plat of U.S. Survey 3316[111] shows two houses and two sheds in this vicinity, although they do not seem to be the same structures found during the archeological reconnaissance for this project.[112] According to Jean Howard,[113] daughter of early Gravina Island settler Vincent

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[107] *Charles M. Mobley, An Architectural and Archaeological Survey of U.S. Coast Guard Facilities, Ketchikan, Revillagigedo Island, Alaska (Draft), manuscript on file with Charles M. Mobley & Associates, Anchorage, AK, 1995.*

[108] *Amanda Welsh, personal communication with Mike Yarborough, Cultural Resource Consultants, June 2001.*

[109] *Cultural Resource Consultants. May 2003. Determination of Eligibility for the Salamanchuk House, KET-776.*

[110] *Mobley,* Archaeological Survey.

[111] *Gordon W. Webber, Field Notes for U.S. Surveys 3094 and 3316, Surveyor General's Office, Juneau, 1954.*

[112] DOT&PF, Gravina Access Project, Archeological Reconnaissance Survey, Draft, prepared for HDR Alaska, Inc., by Cultural Resource Consultants, Anchorage; updated by memoranda from Mike Yarborough, Cultural Resource Consultants, to Mark Dalton, HDR, June and July, 2002.

Boucher, there were numerous small "shacks" on Pennock Island that miners and fishermen used during the winter. The buildings found during the field reconnaissance for this project[114] (KET-774) are within the APE for physical and visual effects. A preliminary determination of eligibility performed for this project indicated that these cabins are eligible for the National Register under National Register Criterion D (information potential).

There is an old rock quarry (owned by R&S Construction) along the western shore of Pennock Island south of the location where Alternative F1 would cross from Pennock Island over West Channel to Gravina Island. Scattered across the overgrown floor of the quarry are several large metal tanks, a portable building, and other construction-related debris. The gravel pit was first used in 1931 by Puget Sound Bridge and Dredging Company for construction of the Thomas Basin breakwater.[115] This site is well outside the APE.

**Gravina Island**

At and near the touchdown of the Alternative F1 West Channel bridge on Gravina Island are the remains of a large barge, a cabin, and large engine. There is also a "boat way" cleared through the rocks on the beach in front of the cabin. These comprise KET-775. The forest along the shore is dotted with cut stumps and at least one CMT. A preliminary determination of eligibility for this project[116] found KET-775 eligible for the National Register under Criterion D (information potential). A site noted on a 1957 U.S. Survey plat (USS 3536) as having a house, shed, and chicken coop lies to the north and is within the APE for visual effects only. The site was not located on current aerial photography or from the beach and, if it exists, is assumed to have integrity only for the information it may provide and to have no visual qualities that might be disturbed. Along the Alternative F1 corridor on Gravina Island is a water line made of 10-inch wire-wrapped wood stave pipe. This line, which extends downhill toward Clam Cove, probably began at a large lake farther inland. It may have provided water to the USFS marine station established at Clam Cove in 1914. The water line, where it is crossed by the alternative, is within the APE. However, it is an isolated artifact and therefore not eligible for the NRHP.

### 3.21.2.3 Alternative F3

**Revillagigedo Island**

Alternative F3 would originate on Revillagigedo Island near the historic dump (KET-435). This site is outside the APE for permanent, direct impacts, but is inside the area for potential visual effects. However, the dump is not considered to have any visual qualities that would be disturbed. The Craftsman House, KET-776, is outside the APE for visual effects and all other effects.

**Pennock Island**

The Alternative F3 East Channel bridge would touch down on Pennock Island in the U.S. Survey 3316 parcel. Webber's 1954 survey plat[117] shows several cabins on the 28 lots that

[113] *Jean Howard, personal communication with Mike Yarborough, Cultural Resource Consultants, May 2001.*

[114] *Cultural Resource Consultants. May 2003. Determination of Eligibility for the Pennock Island Cabins, KET-774.*

[115] *Roppel,* Land of Mists.

[116] *Cultural Resource Consultants. May 2003. Determination of Eligibility for KET-775.*

[117] *Gordon W. Webber, Field Notes for U.S. Surveys 3094 and 3316, Surveyor General's Office, Juneau, 1954.*

make up the parcel, but none within the APE for the alternative. No additional cabins were found within the APE during field reconnaissance. The cabins that were found near Alternative F1 (KET-774) are within the APE for visual effects for F3, but are outside any danger of physical effects.

**Gravina Island**

The touchdown of the Alternative F3 West Channel bridge on Gravina Island would be in the vicinity of the U.S. Survey 3536 parcel, approximately 900 feet north of the cabin and boatway site (KET-775) and the F1 alignment. A preliminary determination of eligibility found KET-775 to be eligible for the NRHP under Criterion D (information potential). It is outside the area of potential physical effects for F3, but it is within the APE of potential visual effects. It is not considered to have visual qualities that could be disturbed. The U.S. Survey 3536 site (house, woodshed, chicken house, and two trails) lies outside the F3 APE for physical impacts, but is within the APE for F3 for potential visual effects. The site was not located on current aerial photography or from the beach and, if it exists, is assumed to have integrity only for the information it may provide and to have no visual qualities that might be disturbed. The forest along the Gravina Island shoreline at the Alternative F3 touchdown is dotted with cut stumps and CMTs. Generally, individual or small numbers of CMTs are not eligible for the NRHP. The F3 roadway would head inland from West Channel along the northwestern side of Clam Cove Creek. Along the Alternative F3 corridor on Gravina Island is a water line made of 10-inch wire-wrapped wood stave pipe. This line, which extends downhill toward Clam Cove, probably began at a large lake farther inland. It may have provided water to the USFS marine station established at Clam Cove in 1914. The water line, where it is crossed by the alternative, is within the APE. But, as it is an isolated artifact, it is not eligible for the NRHP.

### 3.21.2.4 Alternative G2

**Revillagigedo Island**

The ferry terminal on the Revillagigedo Island side of Alternative G2 would be on a fill-covered peninsula now occupied by Temsco Helicopters. No cultural sites are nearby.

**Gravina Island**

The ferry terminal on Gravina Island would be near Lewis Point in the U.S. Survey 1803 parcel, where there is a gravel beach protected between two bedrock outcrops. The point has been logged and several of the stumps have springboard notches. Farther inland is a CMT with a scar that is over 6 feet above the ground. To the south, at the head of the gravel beach, is a grounded barge. In this area are various elements of the AHRS Lewis Cove Sites (KET-670), including a midden and wood-framed structures. The CMTs are within the APE, but, generally, are not considered eligible for the NRHP. KET-670 and the barge are outside the APE.

### 3.21.2.5 Alternative G3

**Revillagigedo Island**

Alternative G3 would originate south of Bar Harbor and north of the Plaza Mall and Carrs grocery store, in the area of a new Burger King. Archeologists and historians from the Alaska Office of History and Archaeology evaluated two buildings in this area—The Market Place and Union Oil station—during a 1990 study of the potential effects of the Tongass Avenue Capacity Improvements Project, but determined that neither were old enough to be eligible for the NRHP.

These sites, dating from the 1970s and 1980s, are still less than 50 years old and therefore are not eligible.

**Gravina Island**

The ferry terminal on Gravina Island would be just southeast of East Clump, near the eastern corner of the U.S. Survey 1600 parcel. In the East Clump area are the remains of numerous early Twentieth Century homesteads. The sites are south of the ferry terminal and outside the APE.

## 3.22 HAZARDOUS WASTE SITES

Known and potential hazardous waste sites in the project area were identified through review of federal and state databases and site reconnaissance. The database search reviewed sites regulated by the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); state-listed spill sites and contaminated sites; and sites with leaking underground storage tanks.

There are no CERLA sites within or adjacent to the construction right-of-way of any of the project alternatives. The database search for RCRA permitted sites identified eight sites that could affect construction of an alternative because a release of hazardous materials from the site could migrate to the project construction area. These sites and their permit status are provided in Table 3-23.

**TABLE 3-23**
**RCRA PERMITTED SITES**

| *Facility Name and Location* | *RCRA Permit Number* | *Potentially Affected Alternative* | *Inspection History* | *Significant Non-compliance or High Priority Violator?* |
|---|---|---|---|---|
| Taquan Air Service Inc.<br>1500 Airport Way Hangar 1) | AKR000004580 | All Build Alternatives | No record | No |
| Petro Marine Services Ketchikan<br>Ketchikan International Airport | AKD000834846 | All Build Alternatives | 8/2000 | No |
| Pro Mech Inc.<br>Ketchikan International Airport | AKD983075615 | All Build Alternatives | No Record | No |
| Alaska Airlines Ketchikan<br>1200 Airport Terminal Building) | AKD983069592 | All Build Alternatives | No Record | No |
| South Coast Inc.<br>4049 Tongass Avenue | AK0001005297 | Alternative C4 | No Record | No |
| City of Ketchikan Landfill<br>1100 Nordstrom Drive | AKD983075979 | Alternative F1 | No Record | No |
| USCG Integrated Support Command<br>1300 Stedman Street | AK8690360492 | Alternative F1 | 8/2000 | No |
| Temsco Helicopter<br>5411 North Tongass Highway | AKD983076407 | Alternative G2 | 8/2000 | No |

Source: EPA Region 10, Enforcement and Compliance On Line Database: http://yosemite.epa.gov/R10/ENFORCE.NSF/webpage/EC-On-Line

Based on review of the ADEC Statewide Contaminated Sites Database[118] and Leaking Underground Storage Tank (LUST) Program Database,[119] there are three known contaminated properties and one LUST site that are within the areas potentially affected by the project alternatives. These properties and sites are identified in Figure 3.18 (Hazardous Waste Sites) and the status of their cleanup is provided in Table 3-24.

[118] *ADEC,* Contaminated Sites Database FOIA Report*, August 30, 2002.*

[119] *ADEC, LUST Program Database, <www.state.ak.us/local/akpages/ENV.CONSERV/ dspar/stp/search.htm>.*

**TABLE 3-24**
**KNOWN CONTAMINATED SITES**

| *Site Name and Location* | *Problem* | *Cleanup Status; Priority* |
|---|---|---|
| | *Statewide Contaminated Sites Database* | |
| USCG Station (1 Mile South Tongass Highway) | Petroleum contamination in soils due to overfilling of aboveground storage tank (AST) and underground storage tank (UST) on north side of barracks and leaking fuel lines between the two; unknown quantity; gasoline-range organics (GRO), metals, and polychlorinated biphenyls (PCBs) in soils | Active; Medium |
| | Diesel contamination in soils from heating oil tank in Commanding Officer's Quarters | Active; Low |
| | Lead (35,000 milligrams per kilogram [mg/kg]) and petroleum product (127 mg/liter [mg/L]) in soil at firing range (active from ~1960 to 1995) | Active; High |
| Ketchikan Tank Farm (1100 Stedman Street) | Petroleum contamination in soil and groundwater; unknown quantity | Inactive; Low |
| Bailey Power Plant (Tongass Avenue near airport ferry dock) | Diesel contamination in soil from buried fuel line leak; unknown quantity | Inactive; Medium |
| | *LUST Program Database* | |
| Ketchikan International Airport | Confirmed release in May 1999; no details in database | Information not available |

*AST = aboveground storage tank; GRO = gasoline range organics; mg/kg = milligram per kilogram; mg/L = milligram per liter; PCBs = polychlorinated biphenyls; USCG = U.S. Coast Guard; UST = underground storage tank.*

*Sources: ADEC Contaminated Sites Database, August 2002; ADEC LUST Program Database, August 2002.*

## 3.23 VISUAL ENVIRONMENT

The visual environment of Ketchikan and Tongass Narrows is defined by the natural and built features of the area. Natural features dominating the view include open water, the steep topography of Gravina and Revillagigedo Islands, and the heavily forested hillsides. The built environment includes the urban and shoreline development of Ketchikan, Ketchikan International Airport on Gravina Island, and those visual elements associated with the developed areas of Ketchikan, such as ships and boats, aircraft, and automobiles and buses.

Overall, the natural scenic quality of the Ketchikan area, and the combination of urban and natural landscape elements, define the overall visual quality of the project area.

### *3.23.1 Tongass Narrows Area*

The visual environment of the project area is dominated by the natural features of Tongass Narrows and the steep mountain slopes characterizing the surrounding landmasses. The lush forests, rivers, lakes, and marine habitat enhance the scenery and create recreation and sightseeing opportunities for tourists and residents of the area. Views from Ketchikan are primarily over-water views toward nearby forested, mountainous islands. Waterfront areas are popular for wildlife viewing, picnicking, hiking, and sightseeing. Viewing scenery is among the most popular activities for visitors in the Ketchikan region. During the summer tourist season,

increases in shipping and floatplane activity in Tongass Narrows create a perception of human dominance in the viewshed.

### *3.23.2 City of Ketchikan*

The City of Ketchikan's visual environment is dominated by a commercial and industrial waterfront, a downtown area with small multi-story buildings, and hillside homes. Most land structures are small- to medium-scale buildings. Cruise ships in the downtown harbor area add a large visual element to the environment.

### *3.23.3 Gravina and Pennock Islands*

Natural features primarily dominate views of Gravina and Pennock Islands from Ketchikan. Except for the airport and the timber processing plant just north of the airport, Gravina Island is mostly undeveloped along Tongass Narrows. Pennock Island is developed only along its waterfront, and this development primarily consists of small residential structures with docks and watercraft.

### *3.23.4 Key Views*

The project team established "key views" representing the visual quality of the project area and views that could be changed by construction of one or more of the project alternatives (Figure 3.19). The locations and directions of key views are shown on the figure. Each key view comprises water, sky, vegetation, natural landscape features, town buildings and structures, as well as other elements of the built environment (e.g., roads, utilities, ships, etc.). Photographic images of these key views are provided below. The alternatives associated with each view are noted parenthetically. No key view was established in relation to Alternative G4 because the alignment of this alternative would be adjacent to that of the existing ferry, and so would not appreciably change any view.

Key View 1: Along Tongass Narrows from shoreline at Saxman (looking north) [F1, F3]

Key View 2: On Tongass Avenue south of U.S. Coast Guard Base (looking north) [F1, F3]

Key View 2A: On Tongass Avenue, south of U.S. Coast Guard Base (looking north) [F1, F3]

Key View 3: Along Tongass Narrows from southern end of Berth 1 dock, downtown (looking south) [F1, F3]

Key View 3A: Along Tongass Narrows from Berth 2 dock, downtown (looking north) [C3a, C3b, C4, D1, G2]

Key View 4: From upper Front Street above the Tongass Avenue/Front Street tunnel (looking south) [F1, F3]

Key View 5: Along Tongass Narrows from upper Front Street on Knob Hill (looking north) [C3a, C3b, C4, D1, G2, G3]

Key View 6: Toward AMHS north berth and Alaska Ship & Drydock (ASD) from AMHS passenger terminal (looking north) [C3a, C3b, C4, D1]

Key View 8: From Gravina Island shoreline near northern end of airport runway (looking north) [G3]

Key View 10: From mid-Tongass Narrows near airport toward Pennock Island (looking south) [F1. F3, G2]

Key View 10a: On Tongass Avenue near Wolf Point (looking south) [G4, G2, C3a, C3b, C4, D1]

Key View 11: On Tongass Avenue north of Wolf Point (looking south) [G4, G2, C3a, C3b, C4, D1]

Key View 12: Along Tongass Narrows from Bar Harbor Float (looking north) [G4, C3a, C3b, C4, D1]

Key View 13: Across Tongass Narrows toward Gravina Island from the north parking area adjacent to Plaza Port West (looking northwest) [G2, C3a, C3b, D1]

## 3.24 ENERGY

Energy use related to this project is fossil fuels used for transportation. Currently, people use automobiles and the ferries to travel between Ketchikan and Gravina Island. Energy is also used by other ships and boats in Tongass Narrows, floatplanes using Tongass Narrows, and other aircraft using the airport, all of which could be affected by alternatives that cross Tongass Narrows (including the airspace above the Narrows). Fuel in the Ketchikan area is supplied by ship. Energy requirements are met by these local suppliers. Some air and marine craft are fueled outside the Borough in other communities or other states.